Magazine of the National Society of Professional Engineers

American Engineer

JULY 1959

unk Lloyd Wright: Architect for an e of Engineering

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MINIATURIZATION

—Engineering's New Technique

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DESERT—HOT BY DAY

Modern heavy-duty Asphalt pavement to endure years of heavy traffic

. . . solves problem of extreme variations of sub-soil bearing values, too.

Here's another Asphalt-paved Interstate highway.

Laid right through the heart of California's forbidding Mojave Desert, from Victorville to Barstow . . . this modern, heavy-duty freeway proves once again that no pavement is as versatile and economical and none is stronger or more durable than a well-constructed Asphalt-concrete pavement.

The project . . . 29.335 miles long . . . is one section in the planned conversion of U. S. 66-91 to Interstate Highway 15. Opened to traffic only last December, this outstanding Asphalt pavement already carries about one-fifth of all traffic between California and neighboring states. By 1980 it is expected to carry 33,600 vehicles per day at speeds up to 70 MPH . . . including some 2800 heavy-duty trucks.

This rugged Asphalt pavement **cost only half as much** as comparable concrete pavement to perform the same service.*

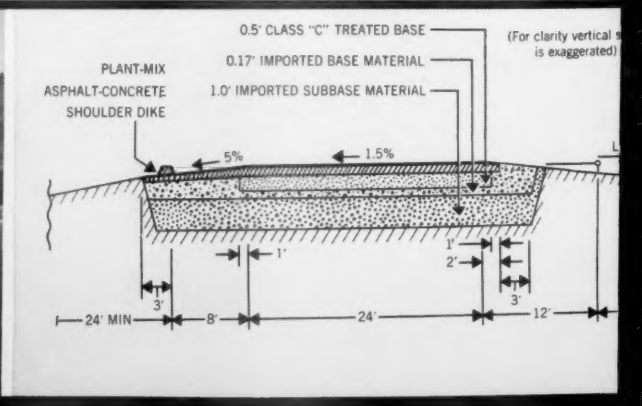
Asphalt design overcomes drastic temperature changes and varying soil conditions.

In the desert country between Victorville and Barstow, temperatures of pavement surfaces sometimes vary by as much as 140°F by day to freezing at night. Here, too, "R-Values"** of the soil vary from as low as 10 to as high as 75.

Asphalt-concrete shoulder dike prevents erosion, aids safety . . . may be placed quickly. To guide desert freshets to prepared drains and to provide a clearly defined shoulder edge, the design of the Victorville-Barstow project called for six-inch-high Asphalt-concrete shoulder dikes. Here you see one being placed at a rate of 24,000 feet per day by modern commercial equipment.

Asphalt-concrete pavement provides for a minimum of expensive materials . . . yet conforms to highest U. S. Bureau of Public Roads strength requirements for Interstate Highways. Notice below that 20 inches of

CROSS SECTION OF VICTORVILL



DESERT—COLD BY NIGHT

on California Interstate 15 has ruggedness and drastic temperature changes

To provide a pavement of **predictable** strength and the durability to stand up under heavy traffic in the face of these drastic conditions, the engineers stripped top cover and constructed subbases and bases of required thickness and quality from nearby borrow.

In this heavy-duty but lower cost pavement, the wearing course is ½-inch of open-graded hot-mix Asphalt surfacing and the leveling course is 3 inches of dense-graded hot-mix Asphalt concrete placed in two courses 1½" thick. An Asphalt prime coat binds the leveling course to the base.

Construction speeds proved excellent... only 17 months to opening day... only 14 weeks to lay the 250,000 tons of Asphalt concrete. And the pavement is superbly smooth-riding.***

Modern Asphalt-concrete pavements... engineered and constructed like the Victorville-Barstow project... are **reputation builders** and **tax savers.** Sure to benefit you and your state for years to come! Specify Asphalt concrete for **your** Interstate highways.

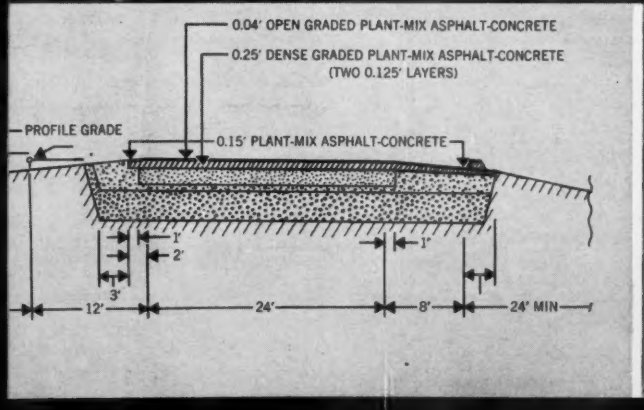
*Based on comparable pavement costs in the same highway district.
**California-developed standard which compares soils on basis of their resistance to plastic deformation under load.
***Average Profile Roughness Index 2 inches per mile.

Ribbons of velvet smoothness...
***ASPHALT**-paved Interstate Highways*

THE ASPHALT INSTITUTE
Asphalt Institute Building, College Park, Maryland

the 23½-inch pavement structure is low cost material imported from a local source. This same source supplied aggregate for the Asphalt plant mix at a relatively low cost.

ARSTOW PROJECT, CALIFORNIA



Set of "doubles" speeds along Asphalt-concrete pavement in comfort and safety. Modern tax-fund-stretching Asphalt pavements are now being specified for many of the nation's heaviest-duty roads. Experience (with the New Jersey Turnpike, with jet plane runways, for example) proves these rugged, durable Asphalt pavements stand up under heaviest traffic.

Letters to the Editor

Enjoyed Consulting Article . . .

Dear Editor:

I have just read "Starting Your Own Consulting Office" by Robert H. Emerick, in the May issue. It is an excellent article and as a consulting engineer, myself, I really appreciate it.

WESLEY E. WOODWARD, P.E.
Denver, Colo.

Congratulations on . . . article; it is the finest I have ever read on this subject. I think every college senior graduating should be required to read it.

JOHN A. MCPHERSON, JR., P.E.
Greenville, S. C.

I have read with much interest and enjoyment the article "Starting Your Own Consulting Office" in the May issue of AMERICAN ENGINEER.

The article is not only humorous but so very true and informative, and I feel sure will be of assistance to many young engineers.

GEORGE R. MORGAN, P.E.
Greenville, S. C.

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Congratulations! The article in the current AMERICAN ENGINEER is excellent. I particularly enjoyed the "formula for ulcers. . . ." The sketches, too, are good and appropriate.

LIONEL G. GALE, P.E.
Boston, Mass.

'Great Interest' . . .

Dear Editor:

I have read the article entitled "Engineering in the 50th State" in the May issue of AMERICAN ENGINEER with great interest.

JACKSON CHUNG, P.E.
Mishawaka, Ind.

Secretaries for PE's . . .

Dear Editor:

The article entitled "Secretaries Being Trained As Engineering Assistants," which appeared in the March, 1959, issue of your magazine, expresses my very own thoughts on the subject of engineering assistants. . . .

DEWITT HUFFMAN, P.E.
Columbus, O.

New Format . . .

Dear Editor:

All the letters I have seen concerning the new format of our magazine have been complimentary and I may be the only reader who preferred the old arrangement of having principal articles featured near the front and easily found. Of course, they are all listed in the table of contents and some on the front cover, but I still get irritated at having to paw through . . . to find them. . . .

WALKER JONES, P.E.
Borger, Tex.

Foreign Students . . .

Dear Editor:

Re: Mr. Paul H. Robbins' "Thoughts on Professionalism" in the March issue. . . .

Mr. Robbins said 647 doctors degrees in engineering were awarded in 1957-58. It would be interesting to report:

(1) How many of the new doctors were citizens of the United States of America?

(2) How many could remain here and wanted to do so?

Regarding his comment on the increase in graduate school enrollment:

(1) How many of the graduate students are American citizens?

(2) How many of those who only obtain an M.S. could stay here and wanted to do so after education was completed?

I believe many colleges will tell you today that a large percentage of the applications for their graduate assistants and fellowships are made by foreign students.

We still have a long way to go in educating our better American students to go into advanced work with the money in industry beckoning as it has been for many years. We have much further to go to get the top flight students to do advanced work and stay in teaching. We have a hard time getting them to take advanced work as undergraduates.

C. HARDY LONG, P.E.
Blacksburg, Va.

Engineer Attaches . . .

Dear Editor:

The idea of appointing technical attaches to our various embassies is excellent; however, in the light of past performance, ability and qualifications of some people whom the public calls scientists, it may turn out to be a tragic mistake if scientists are appointed for these posts.

Without a doubt an engineer, due to his professional activities, is much more qualified to advise on technical developments and economic progress of a country than any other professional man. To evaluate the interaction of science and engineering with foreign policy and its functional effect on our mutual economy, as well as to provide liaison between American and foreign engineers, men who can deal with facts on a stable and unemotional basis are needed.

It might be of value, not only to our profession but to the country as a whole, if the NSPE makes an effort to have at least one engineer assigned to the various embassies.

WALTER W. OFFNER, P.E.
San Francisco, Calif.

Meetings of Note

American Water Works Association—Annual Convention, July 12-17, San Francisco, California.

National Association of Power Engineers — National Convention, July 13-17, Statler Hotel, Boston, Massachusetts.

American Engineer

JULY 1959
Vol. 29, No. 7

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS
FOUNDED 1934

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Member, Business Publications Audit

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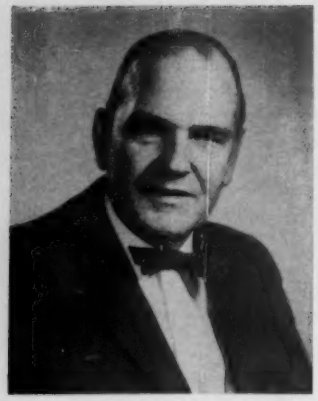


Harold A. Mosher, P. E.

New NSPE President Views the 'Attitude' Of Professionalism

A CLIENT who engages the services of a consulting engineer has a right to expect more from him than high technical competence. Top-flight industrial firms all over the country are insisting that engineers on their staff are "a part of management." In two months, March and April, 1959, 3248 engineers joined with the then almost 50,000 other members of NSPE. Like clients and industrial employers, they were not seeking to enhance their already high technical skills, for NSPE has long held that this type of growth can best be provided through association with one or more of the over 100 technical societies in our country.

Clients, industrial employers, and engineers are all apparently in agreement: the engineer must possess the highest technical skill, yes —but he must offer also an additional PLUS. What is the nature of this plus?

Probably it would most commonly be described as "professionalism," and it is no doubt a proper designation. To my mind it has the limitation, however, of being too vague, of meaning too many things to too many people. To sharpen up the concept, it has been suggested that the distinction between the professional and the highly skilled technical expert is one of *perspective* developed in the former.

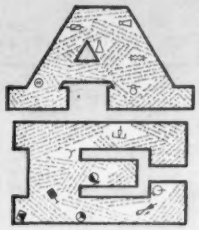
This perspective allows the professional to see his own contribution as an important, integrated part of the whole economic and social structure. It also demands, for his own personal satisfaction and growth, that that contribution will be similarly regarded by his associates. Thus, the project designed by the professional must not only fill the intended need, but must be economically sound so as to use most effectively the savings (capital) of society as a whole as well as that of his client or employer. Similarly, it must pose no threat to the safety or well being of the public, present or future; it must be accomplished without prejudice to the personal rights or prerogatives of others, including his fellow engineers.

Dean Eric A. Walker, College of Engineering and Architecture, Pennsylvania State University, expresses the same thought in somewhat different language. He says, "It all adds up to two attitudes, one defining the moral responsibilities of a man to his work and the other the attitude of the public toward the man as a member of a group. As an attitude, it cannot be legislated—It takes no account of whether the man is a hired hand or a private practitioner, or whether he works in his private quarters or in a big office."

Note that phrase, "it cannot be legislated." We do not become professional by taking an examination in technical principles or by being licensed. Dean Walker also mentions "the attitude of the public toward the man as a member of a group." This attitude must be acquired, must be wanted, not only by the few of us, but by most or all of the approximately 400,000 men and women in our country who are otherwise qualified as engineers.

How then, can the desired attitude be developed among engineers generally? Can one be taught an attitude? Probably not, for the attitude is more of a conviction or faith, than a mental skill, although continued exposure to it in college and post college experience might help in setting a right climate for it to grow. The recipient must want it, must seek it, must take the initiative, must train himself in order to acquire it.

The challenge to NSPE with regards to professional development demands continuing and vigorous emphasis on membership growth, for perhaps the greatest single opportunity for the engineer to train himself in the attitude of professionalism is in participation in his professional society. Here is the fountainhead, where every aspect of professional growth is weighed, debated, determined, promoted, and implemented by concerted action. The man who is a part of it, even on a modest scale, cannot help some of it becoming a part of him.



"This Month"

American industry long has been accustomed to thinking big. Now a unique concept, a new engineering contribution—miniaturization—is coming into the picture. Hundreds of engineers are engaged in this new art of making things smaller, lighter, and, often times, more efficient. Read a really fascinating article which begins on page 17.

When Frank Lloyd Wright died he left an architural inheritance which includes some of the most prophetic industrial and residential structures of this century. The full story of this genius who began his academic training as a civil engineering student is in this issue, page 21.

The National Aeronautics and Space Administration is still less than one year old, but through its research and development facilities and its contracts with universities and private industry, it is well on the way toward becoming one of the country's largest employers of engineers and scientists. You should know about it. The story is on page 27.

How old is Point Four? Four years? Seven? Eight? No, time gets away and it is one full decade since President Truman called for "a bold new program" of technical assistance to underdeveloped areas. Professional engineers have been working during that time in every part of the globe making a great contribution to world peace and human betterment. See page 32 for the report.

Briefing the news:

NSPE welcomes a new president, Harold A. Mosher, P. E., of upstate New York. His message is on page 6. Also, see page 36 for complete roundup story on the news-packed Silver Anniversary meeting last month in New York City.

General news: New salary survey is off the press, page 8. Median income of those surveyed rose to a record high of $10,000. Chem engineers still lead all others in the money department.

Education: A good story here released by the National Education Association calling attention to the fact that too few engineering instructors have necessary advanced degrees. On page 10.

Consulting: In New Jersey, the Attorney General has ruled that the seal of a licensed land surveyor must be attached to tax maps received or filed with the Division of Taxation. The full story on page 11.

Industry: On page 12 the story of a major step by the Butler Manufacturing Co. of Minneapolis, Minn., who has issued an employee policy directive to the effect that only registered engineers may use the title "engineer" in conducting business for the firm.

Government: Another important story, page 14. The Bureau of Reclamation has stopped outside work of its engineers. Recently-appointed Commissioner Floyd E. Dominy issued the ruling which cites the question of "conflict of interest."

Kenneth E. Trombley

Editor

Median Engineer Income at $10,000, NSPE Report Shows

- New 1958 Survey Analyses Salary Data
- Chem Engineers Again Top Earning List

Median income for professional engineers rose to a record high of $10,000 in 1958.

The figure is based on an analysis of 19,240 questionnaires returned by NSPE members for the fourth biennial "Professional Engineers' Income and Salary Survey" published by the National Society.

Earnings were high at all levels, but gains generally were smaller than those recorded in the first three surveys. The median income is up five per cent in the 1958 Survey compared with a nine per cent increase recorded in 1954 and a twelve per cent hike in the 1956 Survey.

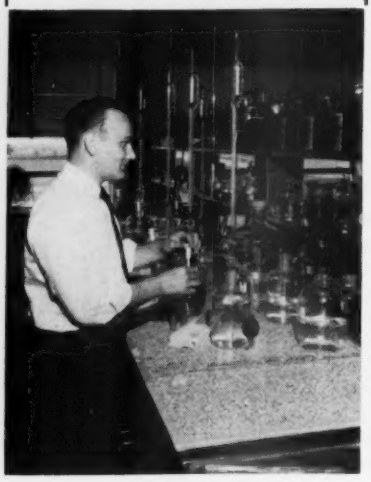
The drop was especially marked at the highest levels. Upper quartile earnings show only a three per cent increase in the 1958 Survey in contrast to ten per cent in 1956. Upper decile incomes actually were down one per cent compared with a nine per cent increase reported in the last survey.

Despite these drops, earnings were high at all levels in 1958 with only ten per cent of the questionnaires listing incomes below $7,040. At least seventy-five per cent of those participating in the Survey reported incomes of $8,250. The upper ten per cent listed incomes of at least $19,680.

Chemical engineers again reported the highest earnings with a median income of $11,170, an increase of $170 over the 1956 figures. Civil engineers remained on the bottom of the salary rung despite a jump in median income from $8,750 to $9,620.

One of the features of the 1958 report is a detailed analysis of salary trends recorded in the four surveys conducted since 1952.

Salary Leaders



Chemical engineers reported the highest earnings in the NSPE survey with a median income of $11,170.

Here are some of the major trends reported in the new survey:

- An increasing proportion of NSPE members work in salaried positions.
- An increasing proportion of NSPE members work and live in the Central, Western, and Southwestern parts of the country.
- All segments of the profession enjoyed further income gains between 1956 and 1958, but engineers connected with the business sector experienced smaller relative gains than those in other types of employment.
- While the younger engineers continued to register salary increases, their gains were in line with those of the more experienced engineers, and not considerably higher, as was the case in the past.
- There appears to be a continuing trend—already apparent in 1956—toward a gradual lessening of certain types of income differentials. In particular, regional salary differentials seem to be decreasing, and there also seems to be a tendency for the various fields of employment to pay similar salaries for comparable work.

In particular the gap between earnings in industry, educational institutions, and the Federal Government was narrower in 1958 than it had ever been before.

Copies of the 1958 Survey may be obtained from NSPE headquarters, 2029 K Streets N.W., Washington 6, D. C. The price is $1 for NSPE members and $2 for nonmembers. An order blank appears on the opposite page.

Outlook Good for Grads, Says Labor Secretary

The job outlook for engineering graduates is, on the whole, very good and for graduates in some specialties, excellent, according to Secretary of Labor James P. Mitchell in an open letter to 1959 college graduates.

He reports that graduates in mechanical electrical and aeronautical engineering will have an advantage over those with majors in civil, chemical and industrial engineering. Mitchell's analysis also finds that employers will be more selective, and that those at the lower end of the class may have to go beyond campus interviews to find engineering jobs.

Continued expansion of the profession is expected both in the next few years and over the long run, the Labor Secretary added, with starting salaries, which showed signs of leveling off in 1958, on the rise again.

Unionism is 'Stumbling Block'—Dean Dougherty

The problem of unionism among civil engineers was brought to the attention of the American Society of Civil Engineers at its recent convention.

In discussing methods of accomplishing professional development in engineering, Nathan W. Dougherty, dean emeritus of Engineering at the University of Tennessee, said that a "great stumbling block" in the way of young engineers is the threat of unionism.

"Fortunately," said Dean Dougherty "it (the threat of unionism) does not raise its head in the small organizations, but it is ever before the larger employer and his employes.

"A few thousand young engineers have gone into bargaining groups, but the vast majority of the more than 400,000 engineers in industry and the public have not been convinced."

The engineering societies, he said, have been outspoken in this matter, and added that if the climate is good in industry, where engineering employees understand the problems of the industry, the efforts to organize engineers into bargaining groups "will fail of its own lack of takers."

The noted educator said that professionalism in engineering, or any profession, is a way of thinking and living rather than an accumulation of knowledge and power.

Structural Design Exams Available

Prof. Odd Albert, of Brooklyn Polytechnic Institute, has announced the availability of structural design examinations, complete with solutions, which were given by the State of New Jersey in December, 1957, June, 1958, and December, 1958.

Priced at $1 each, the sets are available from the New Jersey Society of Professional Engineers, 86 East State Street, Trenton 8, N.J.

Professional Engineers' Income and Salary Survey -- 1958

Income and salary data from nearly 20,000 professional engineers were analyzed in this fourth biennial Survey, sponsored by the National Society of Professional Engineers. The latest information gathered from engineers throughout the country—in all engineering fields—is provided in this handy reference booklet. The 1958 Survey discusses engineer earnings by year of entry into the profession, by geographical region, by type of employer, by engineering specialty, and by a variety of other categories. One of the features of the report is a detailed analysis of salary trends recorded in the four surveys conducted since 1952.

Just off the Press!

Order your copy of the 1958 Survey *today*! A standard reference for engineers, industrial executives, personnel officials—a "must" publication for your engineering library. Complete with charts, tables, graphs.

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Quality of New Teachers Is 'Cause of Special Concern'

Engineering is the most shortchanged field in the supply of qualified teachers in higher education, the National Education Association reports.

The third biennial study of *Teacher Supply and Demand in Universities, Colleges and Junior Colleges* says that the quality of preparation of new teachers in engineering "is cause of special concern." During the five-year period from 1953 to 1958, only one in seven of the new college teachers in engineering held doctorate degrees. At the junior college level two of every three engineering teachers entered full-time teaching service without even a master's degree. Only 2.8 per cent at the junior college level have doctorate degrees.

Approximately one out of three engineers receiving doctorate degrees from 1956-58, went into college teaching, compared to a 44.5 per cent average for all fields.

During the next eleven years, the engineering field will need 25,000 qualified teachers as replacements or to handle increased enrollments, the study shows.

The NEA survey queried the universities and colleges on more use of women in higher education. It reports: "Even in engineering, some of the major institutions express confidence that women might well be entrusted with some of the basic courses. And as pointed out in the report, engineering is the field in greatest need of new teachers with substantial backgrounds of academic preparation."

Sumwalt Named Pres. University of S. C.

The University of South Carolina has named Dr. Robert L. Sumwalt, former dean of engineering, as president.

The 63-year-old educator had served since December, 1957, as acting president. He joined the University faculty in 1926 as an associate professor, became full professor in 1931, and dean of the engineering school in 1943.

Robert L. Sumwalt

A member of the South Carolina State Board of Engineering Examiners, he was recently named "Engineer of the Year" by the South Carolina SPE. Presentation of the award to Dr. Sumwalt was made by Col. Michael J. Blew, NSPE membership representative, during the State Society's annual meeting in June.

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Common Curriculum Urged by Educator

The establishment of "one common, four-year undergraduate curriculum in engineering," has been urged by the head of the Electrical Engineering Department of the Catholic University of America, Washington, D.C.

Joseph C. Michalowicz made the plea in a paper on "Educating Electrical Engineers for the Nuclear Age" presented at a symposium on engineering management at the Middle District meeting of AIEE in Baltimore, Md.

Establishment of a common engineering program would encourage the pooling of engineering talents and facilities on our campuses, he said, and "would lead to a great unifying force in engineering education, if not in developing a more favorable climate for eventually achieving unity within the entire profession. A community spirit would be sparked amongst so many engineers of varied disciplines, as is being displayed presently in the nuclear energy field, which most surely would foster a greater desire for unity than ever before."

He outlined a program that he claimed "should have working possibilities for electrical engineers, chemical engineers, mechanical engineers, and engineering-physicists, and it should serve equally as well for the student planning graduate work in nuclear engineering."

NSF Announces Summer Fellowships for 1960

The National Science Foundation has announced that approximately 550 summer fellowships for graduate teaching assistants will be offered for the summer of 1960. Designed to enable graduate teaching assistance to devote their full summer to study and research, the fellowships will be offered in the sciences, mathematics, and engineering.

AE Consulting—

Surveyor Seal Needed On Tax Maps in N. J.

- Attorney General Gives Ruling
- State Tax Division Questioned

The seal of a licensed land surveyor must be attached to tax maps received by or filed with the Division of Taxation, New Jersey's Attorney General has ruled recently. The opinion was rendered in reply to an inquiry by the State Board of Professional Engineers and Land Surveyors which questioned the propriety of the Division of Taxation's practice of not requiring such a seal on any plans filed with that Department.

One section of the New Jersey statute provides that the Division of Taxation "shall have full control over the preparation, maintenance and revision of all tax maps however prepared." Since duplicates of approved tax maps must be filed with the county clerk or recorder's office in the particular county involved, the statutory provisions relating to filing in the county office must be read in connection with those pertaining to filing in the Division of Taxation, the opinion stated.

In connection with filing in a county recorder's office, the New Jersey code provides that "No map required, or that may be required by law to be filed with a county recording officer, or that may be presented to a county recording officer for filing, shall be received for filing by such officer unless * * * there shall be endorsed thereon or attached thereto a certificate of a land surveyor * * *."

Reading the two pertinent sections of the statute together, the Attorney General concluded that "It is clear by these terms and by those of the statutory requirements for the preparation and filing of tax maps that the tax map filed with the Division of Taxation and with the County are one and the same. Therefore, it is our opinion that a certification of a licensed professional land surveyor, and, in turn, a seal accompanying such attestation must be affixed to such official tax maps."

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Use of Engineering Titles Restricted by Minn. Firm

"The use of the word 'Engineer' in a job title on a business card, letter or in any other manner, if it is to be communicated to the public, is permissible only if the person is a registered engineer. 'Communicated to the public' means any communication outside the company either verbal or written."

This is the policy directive issued by the Butler Manufacturing Co. of Minneapolis. The company action has drawn the commendation of the Minnesota Society of Professional Engineers for upgrading the status of profession engineers.

The company announcement said its policy was for the express purpose of complying with state engineering registration laws. Department heads were advised to continue to encourage engineer employees to become registered in their home state. Special rules for the sales department provide that sales personnel will not use the title, "sales engineer" on calling cards or correspondence, unless the individual is a registered engineer. Graduate, but unregistered engineers performing sales functions will use the title, "sales service representative," but will carry under the title the legend, "graduate engineer." Nongraduates and unregistered engineers will use the title, "sales service representative" or "technical service representative" where appropriate. The same rules will apply to architects in the sales department.

Aside from legal reasons for observing the policy, the firm's announcement said, "is the very real sales reason that loose use of the word 'Engineer' by a nonregistered or nongraduate engineer is resented by the customer or prospect who is a graduate or registered engineer."

Firms Provide Overtime Pay for Professionals

Although professional employees are exempt from the overtime provisions of the Wage-Hour Act, about a third of the companies compensate salaried professionals for overtime, according to a survey by the American Management Association.

Of 434 companies, 148 pay professionals overtime on the following basis: straight time, 36 per cent; time and one-half, 26 per cent; sliding scale, 13 per cent; time off, 5 per cent.

In other categories of exempt personnel, 216 pay overtime to factory first-line supervisors, 157 companies compensate clerical first-line supervisors for overtime, 77 firms report overtime for middle management, and 10 employers reported overtime payments to top management personnel.

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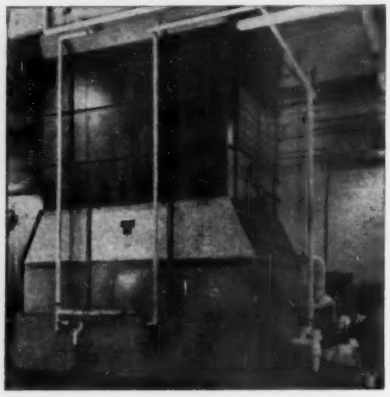

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Societies Announce Election Of New Officers for 1959-60

Several societies have recently announced the election of new officers, while others have named their nominees to serve for the year 1959-60.

Frank A. Marston, of Boston, Mass., has been nominated as president of the American Society of

Frank A. Marston

Civil Engineers. Election will be by mail ballot of the 42,000-plus membership of the society this summer, and the new president will take office at the October ASCE convention in Washington, D.C. He will replace the current president Francis S. Friel, of Philadelphia, Pa.

Mr. Marston is a partner in the Boston engineering firm of Metcalf & Eddy.

Teare Heads ASEE

President-elect of the American Society for Engineering Education is Dr. Benjamin R. Teare, Jr., dean of the College of Engineering and Science at the Carnegie Institute of Technology. He took office at the conclusion of the society's sixty-seventh annual meeting in Pittsburgh, Pa., in June.

Others chosen in a national ballot of ASEE members were:

Dr. Ralph G. Owens, dean of engineering at the Illinois Institute of Technology, to be vice president for general and regional activities east of the Mississippi River.

Dr. Howard W. Barlow, director of the Washington State Institute of Technology at Washington State University, to be vice president for general divisions and committees.

Wendel W. Burton, employment manager for Minnesota Mining and Manufacturing Company, to be treasurer.

Electrical Officers

The election of J. H. Foote, of Jackson, Mich., as president of the American Institute of Electrical Engineers has been announced. He is chief engineer of Commonwealth Associates, and also is vice president and director of engineering for Commonwealth Services, Inc., at Jackson.

The AIEE Tellers Committee announced the election of the following vice presidents:

Donald L. Greene, assistant chief electrical engineer, Gilbert Associates, Reading, Pa.; John W. Davis, outside plant manager, Southern Bell Telephone and Telegraph Company, Altanta, Ga.; Max H. Kight, chief, Electrical Branch, U.S. Bureau of Reclamation, Denver Federal Center, Denver, Colo.; George T. Harness, associate dean of electrical engineering and professor of electrical engineering, University of Southern California, Los Angeles; Dr. Rene Dupuis, commissioner, Quebec Hydro Electric Commission, Montreal, Quebec, and Frederic S. Bacon, general sales manager, Gamewell Company, Upper Newton Falls, Mass.

SAME Elects

New officers of the Society of American Military Engineers which were installed at the group's recent annual meeting include:

President—Vice Admiral W. Orme Hiltabidle, U.S. Navy (ret.), vice president, Charles H. Thompkins Company, Washington, D.C.

First Vice President—Major General Augustus M. Minton, director of civil engineering, U.S. Air Force, Washington, D.C.

Northeastern Regional Vice President—John A. Reilly, vice president and director, Arundel Corporation, Garden City, N.Y.

Midwest Regional Vice President—Danial A. Sullivan, consulting engineer, Armour Research Foundation of Illinois Institute of Technology, Chicago, Ill.

New ASTM Officers

Official notice of election of the new officers of the American Society for Testing Materials was given during their sixty-third annual meeting in Atlantic City, N.J., June 21-26.

The new president of ASTM is F. L. LaQue, vice president and manager, Development and Research Division, The International Nickel Company. Miles N. Clair, president, The Thompson & Lichtner Company, will serve as a vice president, and A. Allan Bates, vice president of research and development, Portland Cement Association, will continue as senior vice president.

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Reclamation Bureau Stops Outside Work of Engineers

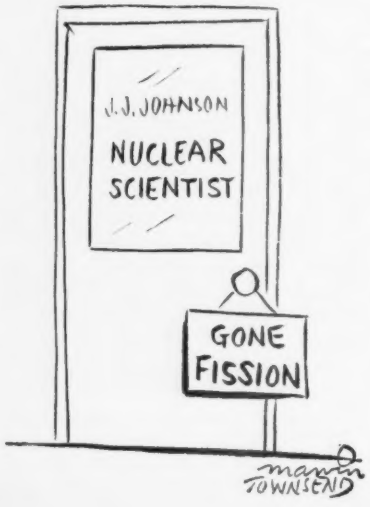
- 'Conflict of Interest' Question Raised
- Commissioner Dominy Issues New Ruling

A new Bureau of Reclamation order has stopped the outside practice of Bureau engineers above the grade of GS-11, and has placed certain limitations and restrictions on the outside employment of engineering employees in grades GS-11 and below. The new instructions were adopted as a result of information received by the Bureau and on the basis of disclosures made during closed-door hearings of a House Appropriations Subcommittee on the Public Works Appropriations Act for 1960 which raised a "conflict of interest" question.

Floyd E. Dominy

During the course of the hearings on the Bureau of Reclamation budget, Representative Ben F. Jensen of Iowa declared that he had received information to the effect that certain Bureau engineers over a number of years have been engaged in activities involving a possible conflict of interest in that their work had involved, at times, projects with which the Federal Government has an interest. Jensen cited a Federal statue which makes it a criminal offense for any Federal employee to accept payment in any form for working on matters coming before any agency, in which the United States is a party or directly or indirectly involved, and declared that the Justice Department should look into the situation.

At the request of the Subcommittee, Floyd E. Dominy, the recently-appointed Reclamation Commissioner, supplied the names of over 200 Reclamation engineers who, since 1945, have performed outside work on projects of matters in which the United States may have had a direct or indirect interest. Mr. Dominy asserted, however, that he knew of only one instance that "specifically" fitted the question of conflict of interest, and that so far as the Bureau knew, the employees performed their outside work in off-duty hours. "To the extent that that work is in violation of an existing code of Federal law," he continued, "we want to stop it, and we certainly want to remove from the payroll any of those people who have performed outside work, knowingly and willingly contrary to department regulations * * *. The entire matter has now been referred to the Attorney General."



With the possibility of a "conflict of interest" being involved, the Bureau has ordered its regional offices to tighten up the supervision of outside employment. A January, 1959, order, originally suspended all authorizations for outside employment previously granted, pending a full review. This was later modified to permit engineering, scientific and subprofessional personnel in grades GS-11 and below to perform outside work which involves technical skills utilized in their official duties. However, the outside work is limited to fifteen hours per week, and must not be in conflict with any related Bureau or Interior Department regulation now in effect. In addition, the order prohibits any type of work on certain named projects in which there may be a Federal interest.

During the course of the hearings, Mr. Dominy declared that "we should not condemn anyone per se for seeking to augment a Federal salary from outside employment of a legitimate nature, and somewhere we have to find out what is proper and what is improper in terms of using his skills on some outside employment." Until this problem is solved, however, the Bureau has stated in its order that requests for permission to perform outside work on Federal projects, projects financed from foreign aid funds, projects requiring licenses or other forms of permission from the Federal Government, projects for which Federal financing is being or is to be sought, or any other projects in which there is or

may be direct or indirect Federal interests "must be disapproved."

In defense of the legitimate outside employment of Bureau engineers, Mr. Dominy declared that the Bureau of Reclamation over the years has accumulated within the framework of its organization the best group of engineers in the field of reclamation, large dams, hydroelectric and related endeavors of any organization in the world. "Private consulting firms who secure a contract to perform engineering services for a municipality or for a foreign government or for private corporations frequently come to the Bureau of Reclamation seeking employees to do some technical work on their own time, because we have the source of the greatest supply of technical knowledge and experience available in this field."

Mr. Dominy further told the Subcommittee that "in this technical engineering field there are so few people qualified that even the professional engineering societies have not frowned upon outside employment by our staff experts."

Consultants Versus Federal Engineers

The long-standing controversy over whether the Government's best interests are served by utilizing the services of private consulting engineers or Federally-employed engineers has been revived during the Public Works Appropriation's hearings.

N. B. Bennett, chief of the Reclamation Bureau's division of project development, told the subcommittee that attempts to contract out part of the Bureau's work have proved very unsatisfactory. "Our estimate now is that we are actually doing more work of a detail nature on an investigation considerably cheaper than consulting engineers are charging for somewhat similar work to private irrigation districts and groups of that kind."

Representative John Taber of New York had asked Mr. Bennett if the Bureau might not save fifty per cent of the current cost of doing investigations by contracting the work out to consulting engineering firms. "Whether or not under a constant Government program of that kind their charges would be less, we do not know," Mr. Bennett answered. "I would doubt very much if it would be. We think we have our costs of investigation down now to quite a reasonable figure. We are continuing to work on that and are doing everything we can every day to try and keep those costs down."

NSPE Objects to Union Sponsored Amendments

The National Society has objected to union sponsored amendments proposed to the Senate's Civil Service Subcommittee which would, "in effect, recognize bona fide labor organizations (unions) as sole spokesmen for Federal employees."

In a communication to Senator Ralph Yarborough, Subcommittee chairman, Executive Director Paul H. Robbins pointed out that "professional engineers by the very nature of their highly-specialized training and the character of their employment do not require unions of any type to act for them in any representative capacity whatsoever."

The NSPE objection referred to proposed legislation which would specifically and exclusively authorize Federal employee unions to participate in the formulation of personnel policies leading to the development of regulations affecting working conditions and grievance procedures.

"In our opinion," Mr. Robbins stated, "union recognition as proposed in Amendments to S. 1638 can only serve to hinder the progressive Federal programs which have been put into effect and which may be planned for the future in order to enable the Federal service to obtain and retain adequate numbers of highly qualified, professionally-minded individuals."

The Society's executive director added that "the proposed amendments would have the practical effect of excluding for consideration in any matter involving employee representation the views, suggestions, and recommendations of any organization which is not classified as a labor organization."

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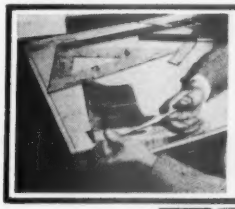

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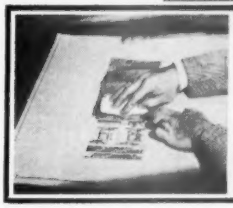

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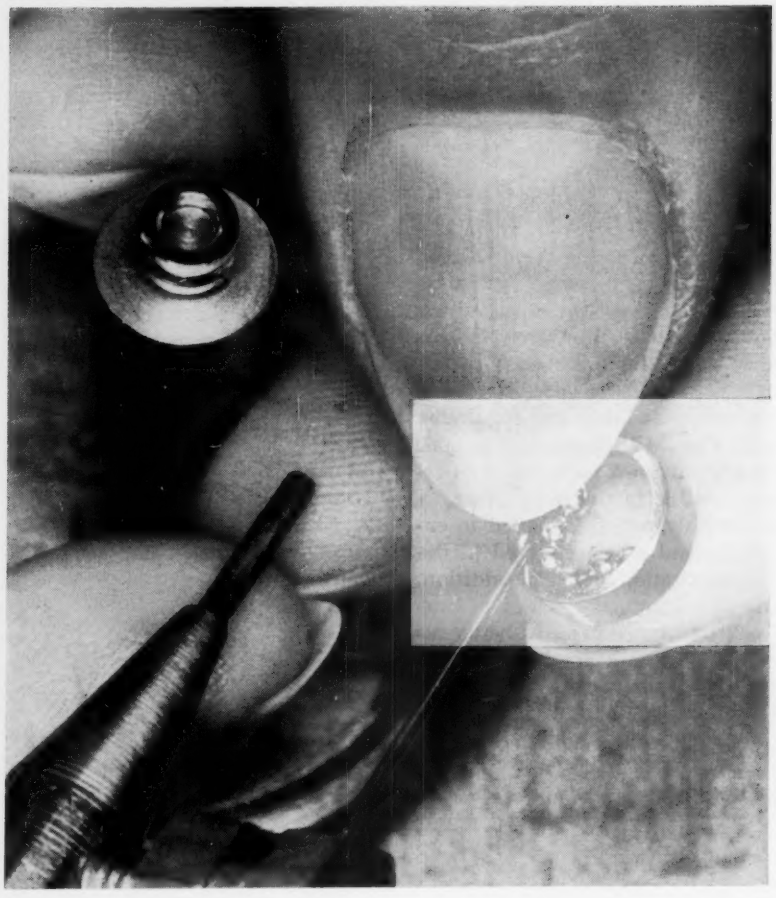


Miniaturization —Engineering's New Technique

By

JOSEPH C. LEWIS

American Engineer Staff

AMERICAN INDUSTRY and bigness have been synonymous for decades. But, today some of the country's biggest and most successful industrialists are thinking in small, even microscopic, terms.

It's all a result of a new industrial engineering technique called miniaturization—the art of making things smaller, lighter and, oftentimes, more efficient.

This Tom Thumb approach is still in the infant stages. The concept was born primarily of military necessity, but the tiny products are moving into the civilian market in increasing numbers.

Engineers in the space and missile field already are deeply involved in miniaturization. And more and more engineers in other branches will be tackling the problems of making things smaller as the concept spreads in industry.

One of the big men in this Lilliputian industrial world is Horace D. Gilbert, president of the Miniature Precision Bearing Company at Keene, New Hampshire. Since taking over the top spot at MPB in 1950, Gilbert has expended a great deal of energies toward developing and promoting the miniaturization art as an important concept for industry.

As part of these efforts, Gilbert's company sponsors the annual "Miniaturization Awards" for individuals and companies which have done the most to further the concept of miniaturization.

This year a five-pound atomic generator developed by the Nuclear Division of the Martin Company at Baltimore carried off the top award. The generator, known as SNAP III, will produce electricity equal to that furnished by a nickel-cadmium battery weighing 300 times as much.

As miniaturization goes, Martin's five-pound marvel is one of the giants of the field. There are such miniatures as capsule-sized radio broadcasting stations for medical diagnosis; hearing aids the size of a thumbnail; dime-sized gyro motors, and tape recorders no bigger than a kitchen matchbox.

Miniature products and components aren't being produced just for the sake of smallness itself.

The miniatures are being turned out for specific functions which can't be performed, or at least not as well, by their larger sized counterparts. Some of the advantages of smaller, lighter parts are obvious. They take up less space, require less power to operate, generate less heat and, in many cases, are easier to maintain.

The space and weight factor can be extremely vital in many projects. This is particularly true in the missile field where miniaturization has received its widest acceptance. Reduce the weight of the missile's equipment by a pound and 100 pounds in the fuel load is saved.

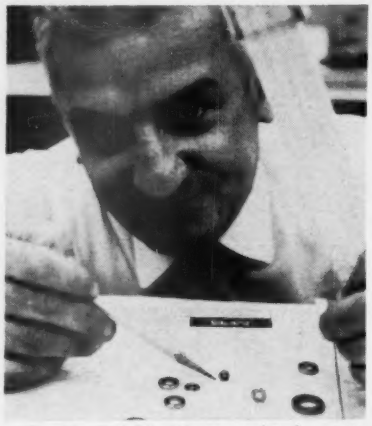
NEARLY eighty per cent of the MPB plant's production of miniature bearings is going into defense work, most of it in the missile and space areas. But, the company's engineers expect a steady increase in the peaceful civilian applications of the miniaturization art. To date more than 16,000 different uses have already been found for the tiny bearings produced by the New Hampshire firm.

High speed dental drills which have taken much of the pain out of dentistry are the biggest users of the miniature bearings outside of the defense field. Thousands of the bearings are turning in midget gyroscopes, tape recorders, electrocardiograph machines, and industrial control systems.

Even the oil industry, which usually thinks only in giant-sized terms, is finding uses for miniaturization. Several dozen tiny precision bearings function in a newly developed magnetometer which is trailed behind an airplane in prospecting for new oil fields.

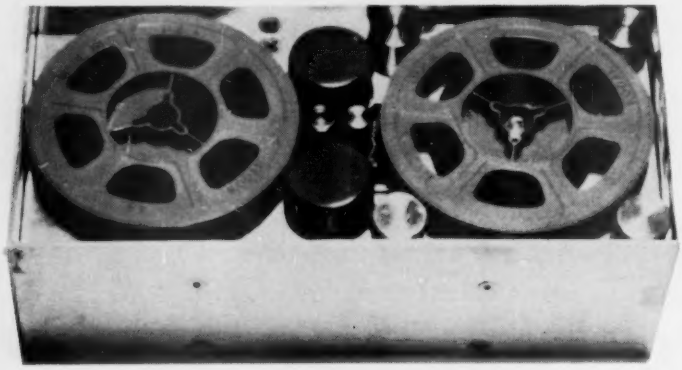
A new problem is tossed in the laps of MPB's engineers almost daily. The engineering staff must pretty well meet these challenges on their own initiative. There are few technical publications in the field and specific college education in the art is almost nil. The MPB engineering staff now has its own technical publication, MPB Engineering News, a bi-monthly, which is mailed to engineers and others engaged in the miniaturization field. In addition, the staff conducts a series of one-week training courses to better acquaint its customers with some of

An engineer at the Martin Company's Nuclear Division in Baltimore tests the radioisotopic battery which won the 1958 Miniaturization Award.



R. H. (Nick) Carter, chief engineer at Miniature Precision Bearings, and some of the tiny bearings he works with daily. He has been with MPB since 1939.

This three-pound tape recorder, constructed at home by Stanford University student, Keith O. Johnson, won a certificate of excellence in this year's "Miniaturization Award" competition. The four-channel recorder is about the size of a kitchen matchbox and functions for about ninety hours from its self-contained batteries.



A worker peers intently into a microscope as a miniature bearing is assembled. The tiny products are part of a growing industry centered around the art of making things smaller.

Harry Hanan, center, assistant chief engineer at Miniature Precision Bearings, discusses one of the miniature bearings with a company official. The engineering staff at MPB has designed more than 500 different miniature bearings, some as small as one-tenth of an inch in outside diameter.

Using special tweezers, workers assemble bearings at MPB. The women work in a special "White Room" sealed off from the rest of the plant to insure that no dirt ruins the miniature bearings. They are dressed in lint-free nylon coats and hats as another precaution against clogging the tiny raceways of the bearings.

the more technical aspects of precision bearings.

A look at some of MPB financial figures gives a pretty good picture of how well miniaturization has caught on in the past ten years. In 1950, the firm reported sales of $288,000. This year the figure was at $6,797,000. And the company expects to increase this by another twenty-five per cent next year.

Raymond H. (Nick) Carter, P.E., chief engineer, joined the company in 1939 when it was still in the infant stages of development. "My office today is bigger than the whole production room was then," Carter recalls. The company now operates out of an ultra-modern plant containing 80,000 square feet of floor space.

Carter and his then-boss, W. S. Pierce, Jr., got their first big contract for miniature bearings early in World War II. It started with a somewhat mysterious order from a man named Carl Norden requesting a dozen tiny bearings made to exact specifications. There wasn't any explanation concerning how the bearings were to be used, but Carter quickly made the miniatures and sent them on their way. A few weeks later in came an order for 600 more of the same bearings from Sperry Gyroscope, the leading manufacturer of the Norden bombsight which played such a vital role in World War II.

TODAY, MPB is the biggest manufacturer of the miniature bearings. It turns out 500 different bearings, some no bigger than one tenth of an inch in outside diameter.

Aside from its obvious money-making qualities, the New Hampshire plant is something of an engineering marvel in the 20th Century industrial world. There are no giant cranes or big noisy conveyors normally associated with a major industrial plant. Here a pair of tweezers and a microscope are common everyday tools.

And there are probably few industrial plants—or for that matter hospital operating rooms—with higher standards of cleanliness. For even the tiniest speck of dust is like a boulder when it gets in the raceways of MPB's sub-miniature bearings.

Final assembly is carried out in a "White Room" sealed off from the rest of the plant. Here the air is filtered to remove particles down to 1/1,000,000 of an inch. Women workers dressed in special lint-free nylon coats and caps enter the room through two air locks. Finished components are fed into the room through a single small window. A positive air pressure which is maintained in the room prevents any dust from entering when the parts go through the window. Once in the White Room the parts emerge again only completely assembled and packaged hermetically sealed plastic strips.

Inside the White Room the bearings are washed, assembled, washed again, gauged, given a final re-polishing, tested for performance, washed, lubricated, and then packaged. Many of the bearings are so small that the assembly can be accomplished only under 20-power microscopes. The components are either handled with rubber gloves or special tweezers to prevent them from being corroded by perspiration from the workers' hands.

The plant makes its own special oil and grease developed to meet the super-cleanliness standards required for the miniature bearings. Most of the bearings are lubricated before packaging with a single drop of oil from a hypodermic needle.

Precision in the MPB name means exactly that. Ball complements are held to size and roundness to within ten millionths of an inch and in some cases to within two millionths. The roundnesses of outside diameters, bores and ball grooves are held to between twenty-five and fifty-millionths of an inch.

The bearings are constantly checked and rechecked at every stage of the production. After leaving the grinding and polishing machines they go into a room known as the "Toll-Gate" where every detail of the bearings is given a thorough going over. Anything less than a Class 5 bearing

A workman uses a magnifying glass to check a tiny bearing at the MPB plant at Keene, N. H. Many of the bearings are so tiny they must be assembled and inspected under twenty-power microscopes.

is either scrapped or sent back for further work.

A day's total production at the plant is usually less than fifty pounds, but this pile of bearings is worth anywhere from $15,000 to $25,000.

A SUBSTANTIAL part of MPB's profits are being plowed back into research in an effort to develop new methods of production and new applications for the tiny bearings. The company now is planning to build a $500,000 research center to expand this phase of its work.

The growing acceptance of miniaturization as useful engineering technique is reflected in the wide interest in the annual "Miniaturization Award" competition. This year, seventy tiny entries ranging from electronic devices to atomic generators poured into the awards committee. Next year the committee expects more than twice this many.

One of the features of this year's competition was a tiny medical radio pill developed by Dr. V. K. Zworykin of Rockefeller Institute. The pill includes a complete high-fidelity FM radio broadcasting station including a microphone, power oscillator, antenna, and battery. The pill is designed to be swallowed and broadcast its findings as it travels through the body. It is expected to be invaluable in medical diagnosis.

Peter J. Pijoan and John Buckley, a pair of Westinghouse engineers, entered a dime-sized gyro motor which is capable of attaining speeds up to 27,000 revolutions a minute. And then there was a Stanford University student, Keith O. Johnson, who built a precision tape recorder about the size of a kitchen matchbox.

Some of the other top awards went to Elgin Micronics for development of a micro-miniature synchronous motor and gear train for use in an elapsed time indicator; Robert W. Yancey, for work performed at the Diamond Ordnance Fuze Laboratories on a novel, sub-miniature telemeter, Sonotone Corporation for development of its Model "222" hearing aid, first hearing aid worn entirely in the ear; Patek Philippe and Company of Geneva, Switzerland, for a miniature frequency and time standard believed to be the smallest complete crystal clock in the world; The Heald Machine Company, for making a radically new grinding machine for production of miniature ball bearings, Servomechanisms, Inc., for development of an evaporated magnetic film stepping strip which permits remarkable reduction in the overall size of a logic or memory element in high speed digital computers and Diamond Ordnance Fuze Laboratories for pin-head sized indicator lamps.

A YEAR ago Diamond Ordnance Fuze Laboratories of the U. S. Army won the top award for reducing an electronic subassembly to the size of a postage stamp. RCA turned up with a receiver one cubic inch in size. The receiver, called the Megacoder, can be preset to respond selectively to any one or more of more than a million coded signals sent from a transmitter operating on a single frequency.

The list of successful applications of the miniaturization art could go on and on. And new concepts for the utilization of the process are being dreamed up daily by engineers.

In the military field the complexity of Space Age weapons and vehicles has made the development of smaller products and components mandatory. In addition to the new miniatures, a number of old standard military items, like the radio pack, have been greatly reduced in size and weight. In World War II, the American foot soldier was weighted down with a 40-pound radio pack. The Army has now reduced that to 29 pounds and is hoping to produce a 15-pound pack by 1960.

The requirements in the civilian field aren't nearly so urgent, but miniaturization is finding a steadily growing market in industry.—**End.**

Another example of miniaturization, the art of making products lighter, smaller and more efficient. This miniature is sensitive enough to measure a human breath.

Q. What is Architecture?

A. Architecture is the scientific art of making structures express ideas.

—Frank Lloyd Wright

Frank Lloyd Wright: An Architect for an Age of Engineering

By

JOHN T. KANE

American Engineer Staff

Built on a cantilever design, Wright's Price Tower in Bartlesville, Oklahoma, has its floors and walls projecting from four interior vertical shafts of reinforced concrete.

With the death of Frank Lloyd Wright, architecture lost its greatest practitioner of the first half of the 20th Century—a loss that is shared to a considerable degree by the engineering profession since Wright was, more than anything else, an architectural designer and builder for an age of engineering.

In the ninety years that span Wright's birth and death, America has moved into an explosion of technological development which has touched even the simplest building materials and techniques. Much of the history of this technological progress may be read in the residential structures which Wright pioneered.

There is hardly a segment or a school of contemporary architecture today to which Wright has not contributed through his innovations and adaptions. Our low, modern homes with wide protective roofs, extensive glass partitions and glass wall areas, split-level living quarters, the opened living and dining room relationships, air conditioning, central and radiant heating, concrete block construction, carports (he coined the term), reinforced concrete, metal office furniture—all of these ideas were freely

Frank Lloyd Wright in his Arizona winter home and workshop, Taliesin West.

utilized by Wright long before they became part of our ordinary building practices.

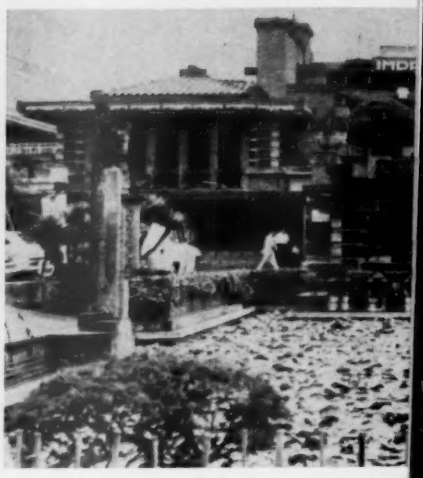
In pushing ahead into these new areas, Wright was ever mindful of the varied uses to which building materials, particularly glass and steel, could be put. Describing the famous Unitarian Church in Oak Park, Illinois, built in 1906, Wright said: "The first idea was to keep a noble room for worship in mind and let that sense of the great room shape the whole edifice. What shape? Well, the answer lay in the material: concrete was cheap. Why not make the forms so the concrete could be cast as separate blocks and masses, these grouped about an inner space?" So Wright made the church one of the earliest examples of an excercise in the aesthetics and structural practicality of reinforced concrete.

But his real and life-long battle was with those who could not or would not face up to the challenges of the new age of science and technology. While most American architects at the turn of the century were re-creating Italian villas and Roman temples, Wright was hammering out his architectural philosophy on the credo expressed in this paragraph from his essay on *The Art and Craft of the Machine*:

"In this age of steel and steam the tools with which civilization's true record will be written are scientific thoughts made operative in iron and bronze and steel and in the plastic processes which characterize this age, all of which we call machines. The electric lamp is in this sense a machine. New materials in the man-machines have made the physical body of this age what it is as distinguished from former ages. They have made our era the machine age wherein locomotive engines, engines of industry, engines of light or engines of war or steamships take the place works of art took in precious history."

The curve of progress in his own buildings over the years reflects Wright's efforts to make his architecture incorporate the scientific and technological developments of this century. In his early "prairie houses" in the Midwest, Wright broke up the rigid patterns of individual four-walled rooms, and originated the concepts of the modern residential floor plan as we know it today. In his early industrial structures such as the Larkin Building in Buffalo, built for a mail order firm, Wright demonstrated his sound grasp of the engineering principles involved in designing for a large business operation. In the Johnson's Wax Company buildings in Racine, Wisconsin, begun in the 1930's, Wright passed another milestone in his seven-decade-long journey toward a merger of art and engineering.

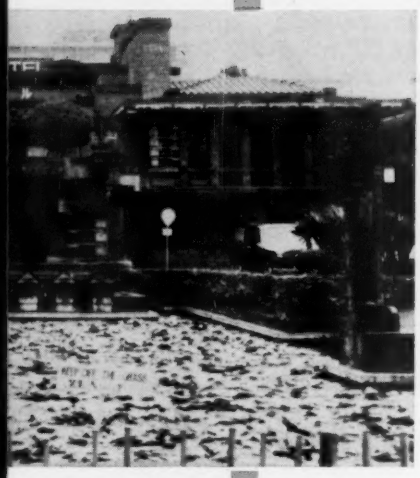
The Johnson Research and Development Tower is believed to be the tallest building ever built without foundations directly under the side walls. It is more than 150 feet tall and is forty feet square, yet at ground level it is supported by a base only thirteen feet across at the narrowest point. Each of the fifteen floors of the Tower is cantilevered from a central core anchored to a concrete foundation which is sunk fifty-four feet into the earth and supports the building in much the same way as does the taproot of a tree. The central core is a cluster of circular, reinforced concrete

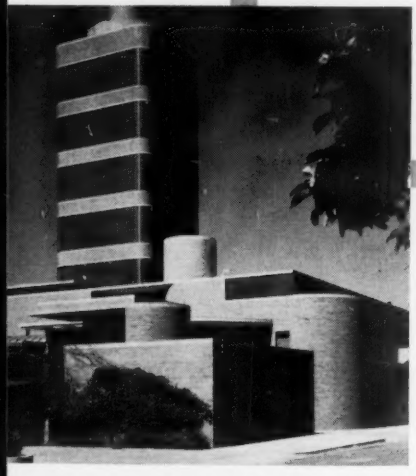


Wright "floated" the foundation of Tokyo's Imperial Hotel on sixty to seventy feet of soft mud below eight feet of surface soil. Architects all over the world are protesting the proposed destruction of the building.

shafts for air supply and exhaust pipes, plus an elevator and stairway. Each floor in the glass-walled Tower is a chemical laboratory for carrying out basic and applied research and product development. When the administration building adjoining the tower was completed in 1939, it was one of the first completely air-conditioned offices and one of the first to use radiant heating. Never one to stop at merely furnishing his client with a building, Wright also designed all the office furniture. The Johnson Research Center has long been a leading tourist attraction in Racine, and the company was probably not unpleased when a group of architects selected the center as one of the "seven wonders of American architecture."

THE PRICE TOWER in Bartlesville, Oklahoma, is another example of Wright's handling of large structural forms. Built on a cantilever design, all floors and walls in the 221-feet-tall structure project from four interior vertical shafts of reinforced concrete. The shafts divide the Tower into four separate verti-





At 150 feet tall, the Johnson Research and Development Tower in Racine, Wisconson, may be the highest building ever erected without foundations directly under the side walls.

cal quadrants. None of the exterior walls are structural, but are merely screens resting on the horizontal cantilevered floors. Copper louvers cover the window surfaces to offer shade protection. All the glass is gold tinted, and stamped copper plates decorate the facia on the exterior of the building. A triangular fire escape running vertically down the east side of the building serves as a balcony to give tenants access to the open air. The interiors and furniture in that part of the Tower occupied by the Price Company were designed by Wright. Of the Price Tower, Wright has said: "As a type the quad thus standing on a central-stem has great advantages not only where compactness and economy of plan are desired but the type offers great privacy because complete isolation of the four parts gives each unit of each part perfect privacy and unobstructed views of the rolling countryside."

In his 80's, somewhat like Michelangelo working away on the ceiling of St. Peter's in Rome, Wright proceeded to design one of the most unique structures ever to appear in an American city—the Guggenheim Museum in New York. In a setting of rectangular sky scrapers, Wright's design presents a flowing mass of curvatures in concrete. The plan of the Museum takes the form of a series of ascending spiral ramps. The walls along the ramps will hold the Museum's collection of non-objective paintings. The usual opposition to a radically designed structure was expressed when the building was first proposed. However, now that it is nearing completion, the considered architectural opinion appears to be that the Guggenheim Museum will be another structural and aesthetic masterpiece in the Frank Lloyd Wright tradition.

In each of these structures the pioneering of the designer was never out of touch with the understanding of engineering principles on the part of the man. Wright began his career as a civil engineering student at the state university in Wisconsin. In his autobiography he refers again and again to the significance of the mathematics he learned in his otherwise unfruitful school years. The Imperial Hotel in Tokyo is probably the best known illustration of Wright's engineering knowledge and skill. Starting his designs in 1917, Wright was faced with the problem of erecting a building that would withstand the severe Japanese earthquakes. "Long piles," he decided, "would oscillate and rock the structure. Therefore the foundation should be short and shallow. There are sixty to seventy feet of soft mud below eight feet of surface soil on the site. Why not float the

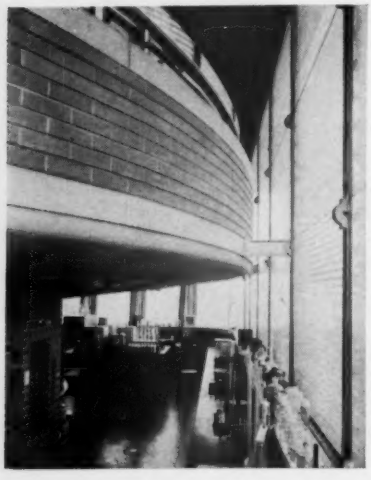
In the Guggenheim Museum in New York City, Wright used a spiral ramp as his structural design. The Museum's collection of modern art will be displayed on the walls of the ramp.

"There is a splendid isolation; a complete dominance," said Wright of his Price Tower, and its spaces command "the wonders of light and sky over the rolling plains of Oklahoma."

building on it like a battleship?"

The Imperial Hotel was duly "floated" and Wright's plans and specifications were duly ridiculed by numerous engineers and architects. In his autobiography Wright tells how the Western Society of American Engineers gave notice that the "scheme for foundations was unsound." Spokesmen for a major American architectural organization declared the work an insult to American architecture and predicted that the whole building would tumble down with a heavy loss of life in the first big earthquake. The test came in 1923 when Tokyo was virtually destroyed by one of the most violent earthquakes on record for the area. Wright was called by the San Francisco Examiner and told that the Imperial Hotel was completely demolished. Days later, when communications with Japan were restored, the same paper carried the real story: *Wright's Imperial Hotel was practically the only large building in Tokyo to come through the quake undamaged.* Furthermore, hundreds of Tokyo residents had taken refuge in the building as fires swept across the city.

In 1896, Wright built an odd looking water tower on a farm owned by two of his aunts in Wisconsin. Local "construction experts" were always giving it just one more year before an inevitable collapse. The tower is still standing and most of its critics have long since gone to their graves.



Each of the fourteen floors of the Johnson Research Tower is a chemical laboratory built around a central core of reinforced concrete that penetrates fifty-four feet into the earth.

IN the engineering soundness of his designs, Wright seemed to be always harking back to the lesson he learned as a boy of sixteen, when he witnessed the crumbling of a newly-built wing of the State Capitol in Madison. "I heard the roar of collapse," he reminisced years later, "I saw the clouds of white lime dust rise high in the air; heard the groans and cries of those injured and not killed—some forty workmen dead or seriously hurt. I remember clinging to the iron palings of the park in full view of the scene, sick with horror."

No one has yet witnessed such a tragedy involving a Wright structure. But where earthquakes and the stresses and strains of time have failed, the spirit of restless technological change to which Wright was so sensitive has succeeded in obliterating many of his early works. Decayed urban neighborhoods have caused the demolition of some of his finest buildings. The Imperial Hotel is about to be razed—over the strenuous protests of architects and architectural societies.

The very groups which were most critical of Wright in his early and middle years are now among his strongest advocates. In an editorial in the *Journal* of the American Institute of Architects shortly after his death, Wright was cited as doing "most of the basic thinking for the whole modern movement in architecture. He had his teachers, of course, but he synthesized the late 19th century philosophies of architecture into a working gospel, which he preached and practiced—against the most fearful odds and hardships in his early years—until he won almost undisputed acknowledgment of the rightness of his thinking. Even his detractors have had to admit the great fertility and creativity of his genius—and genius he truly was, our great architectural genius of modern times."

A doctor can bury his mistakes, but an architect can only advise his client to plant ivy.—Frank Lloyd Wright.

The Gold Medal of Honor presented by the AIA to Wright in 1949 was one in a collection of awards that made him the most decorated architect in the modern era. Perhaps the most cogent summary of Wright's role as an architect was made in 1950 by the historian Henry S. Commager in *The American Mind*: "Wright was the first major architect since the days of the early Republic to consider the house as a whole, fit it into the ground, blend it into its environment, harmonize style, materials, and furnishings, let in light and air, exploit the findings of technology for plumbing and heating. He was the first, too, to use freely all the resources of modern construction—glass, steel, copper, plastics, tile—and to apply these to interiors and to furnishings. And to building after building, for a period of over forty years, he triumphantly applied the principle of functionalism, the technics of engineering, the materials of science, with imagination and audacity."—End.

FROM WASHINGTON

BY
MILTON F. LUNCH,
N.S.P.E.'s Legislative Counsel

PROFESSIONAL STATUS THROUGH LEGISLATION

DOES the Government really want to secure and hold the best possible engineering and scientific talent at a time when that talent is in high demand and is recognized by virtually all Governmental leaders as vital to the national welfare? The answer to this basic question must be a resounding "Yes!"

Six weeks ago, at a two-day Conference on Scientific Manpower, sponsored by the Civil Service Commission, speaker after speaker of the highest rank and prestige emphasized the importance of engineers and scientists to the national welfare and soberly discussed ways and means to achieve this objective. From the President of the United States, Cabinet heads, Congressional sources, and official Government reports of various types, we have heard over and over about this direct relationship of technological personnel to national survival and economic growth.

Yet, at the recent conference, the single most publicized aspect was the comment by Rocco C. Siciliano, special assistant to the President for personnel management, that the Administration is opposed to legislation to establish a separate job classification and pay system for the Government's 100,000 engineers and scientists. He could have said "re-establish" because there was a separate professional schedule until 1949, when it was consolidated with the clerical, administrative, and fiscal schedule for the sake of uniformity and supposed efficiency. We have been paying for that mistake ever since despite a continuing effort in recent years to have the professional schedule restored.

Mr. Siciliano objected to an engineer-scientist professional schedule because it would pay professional employees higher salaries than their comparable GS grades, would lack flexibility, would not recognize exceptional ability or outstanding performance, and would be "special treatment" which would "start us in the vicious circle of professions competing with one another for pay and recognition." Each of these arguments falls of its own weight: Obviously the professional schedule would pay higher rates than those paid for the same-numbered GS grades in other fields. That is being done right now through the expedient and temporary means of paying higher starting salaries to newly appointed or promoted engineers and scientists. If Mr. Siciliano means that the Government should necessarily pay a GS-12 nuclear engineer the same rate as a GS-12 clerical or administrative employee, regardless of the job market, regardless of non-governmental opportunities and regardless of the relative importance of the two, then we have a "head in the sand" attitude which all the conferences in the world will not solve.

Rocco C. Siciliano ►

Rather than retard flexibility, a separate professional schedule would make it possible. Today we have real inflexibility by putting scarce and vital personnel in a strait-jacket with others. In effect, to meet competitive conditions for 100,000 employees, Congress has to raise the pay rates for more than two million employees. It appears certain that Mr. Siciliano's reference to flexibility, however, pertains to the idea of Congress letting the Executive Branch set Federal pay scales on some sort of prevailing wage concept, such as is used for blue collar employees. People have been talking about this for years, and at the present time there does not seem to be any sign

(This month's "From Washington" column has been extracted from a talk presented by Mr. Lunch at a meeting of the Functional Section for Engineers in Government Practice at the NSPE Silver Anniversary meeting.)

whatsoever that Congress will ever abandon its control over Federal salaries and delegate that authority to the Executive Branch of the Government. Even if this system could be achieved, there is a considerable question whether the personnel people in charge today would accept the principle of pay rates adjusted to market conditions for specialized categories of employees. One may fairly well ask if we wouldn't wind up with the prevailing philosophy that every

◄ Roger W. Jones

classification of employment in the same grade must be paid the same rate.

There is no real problem, of course, with regard to Mr. Siciliano's objection about recognizing exceptional ability or outstanding performance. This is indeed highly desirable and there should be no difficulty in providing for it in a professional classification law. If precedent or example is needed, Congress could simply lift out and incorporate the provision in present law whereby doctors and dentists in the Veterans Administration may be rated as specialists and receive a fifteen per cent increment to basic pay. Or, it can be provided on some other basis, such as the special supplemental pay authority for military officers in critical positions of unusual responsibility of a stated sum per month within minimum and maximum figures and limited to a percentage of the over-all officer strength.

Finally, there is the objection of the professions competing with one another. This merits several observations. First, it already exists under the present expedient system because some professions received top-step-of-the-grade recognition while others did not. Second, it has always been, and always will be, a difficult but necessary choice in personnel management to decide that one employee or one classification rates higher than another. Is the Government and the Civil Service Commission, particularly, so weak that it cannot cope with disappointed groups and justify the decision, as they did in the case of the disappointed biologists who were excluded from the top-step-of-the-grade move because they simply did not meet the law's requirements of criticality? Third, is our Government against competition for pay and recognition based on special knowledge and the application of that knowledge in the public service? If we are truly against competition for pay and recognition then we had better stop the intensive efforts of Governmental agencies and many others to induce more of our young people to go into engineering and scientific study because, we tell them, they will be rewarded in pay and recognition for their much-needed service.

It now seems to be a sad, but true, fact that if the problem is going to be solved through the re-creation of an engineering-scientific professional schedule it will have to be done over the active opposition of the Administration. For a time it appeared that some progress and some objective study could be achieved through a commission to make a complete study of the various Federal pay systems and practices, as proposed by the President. The Congressional reaction

Tom Murray ►

has been noticeably lukewarm, if not cold, and there has been no action to establish such a commission through legislation other than the introduction of bills. Even if Congress should create the study commission, or if the President should establish it without legislative backing, the Administration's announced attitude on a professional schedule gives scant comfort that the study would produce any significant gain in this direction.

One glimmer of light in an otherwise dark picture is the recent announcement by Chairman Tom Murray of the House Civil Service Committee that his Committee staff will conduct a full-scale investigation of the Classification Act and the salaries and grades of the Government's classified employees. It has been reported that one of the areas expected to be included in the study will be the setting of professional, engineering and scientific salaries. The staff study probably will begin as soon as Congress adjourns for the year, and findings and recommendations will be made to the Committee when Congress convenes in January.

Another hopeful sign of eventual accomplishment toward the goal of a separate professional schedule is the following sentence from the address of Civil Service Commission Chairman Roger W. Jones at the Scientific Manpower Conference: "But no vested concept has been able to stand against the moving force of scientific discovery—in or out of Government." It should be made clear that Mr. Jones was not speaking for the professional schedule; in fact, he is against it, but apparently a little less dogmatically than Mr. Siciliano. At least, Mr. Jones said he was willing to take another look at it if the engineering and scientific people insisted upon that approach.

Although it appears that the engineering profession and other groups have a formidable task facing them to convince Congress of the soundness and necessity for the re-establishment of a separate professional classification and compensation system, despite the opposition of the Administration, even the most obstinate archaic ideas of personnel management must crumble against our present-day, rapidly expanding technological revolution.

AE Staff Report:

NASA Sets Pace In Launching U. S. On Road to Space

The first astronaut pilot will see this view of the earth from his Project Mercury capsule orbiting some 120 miles over Cuba.

WHO, in the years when Dolly Madison's house was a center of social life in the Capital City of the infant United States, could have possibly imagined that the site would one day be a part of the headquarters for America's multi-billion-dollar exploration of outer space?

In an ancient brown stucco building on Lafayette Square—just across a small park from the White House—the ghosts of the wigged and crinolined figures of the early 19th Century can daily brush against engineers and scientists who carry in their briefcases the plans and specifications for moving man and his instruments out into the solar system and beyond.

Crowded into antiquated, makeshift offices, the administrative headquarters of the National Aeronautics and Space Administration is probably one of the busiest Federal agencies in Washington. It is certainly the youngest, as it will not have had one year of existence until October, 1959. The fledgling NASA has already committed approximately $350 million to aeronautics and space research and development, and is looking toward a budget appropriation on the order of a half a billion dollars for the fiscal year 1960. NASA inherited some 8,000 employees from its predecessor agency, the old National Advisory Committee for Aeronautics, but through its contracts with universities, research labs, and private industry, the new space agency is well on the way to becoming the nation's largest employer of engineers and scientists.

NASA became part of the bureaucratic landscape in Washington as a result of the National Aeronautics and Space Act of 1958. Its over-all assignment under the law can be neatly summed up in three key paragraphs from the Space Act:

1. Plan, direct, and conduct aeronautical and space activities.

2. Arrange for participation by the scientific community in planning scientific measurements and observations to be made through use of aeronautical and space vehicles, and conduct or arrange for the conduct of such measurements and observations.

3. Provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.

In the cut and dried legal language of those three paragraphs there does repose the statutory sanction for some of the most fantastic engineering enterprises ever undertaken by man. For the phrase "space activities," as interpreted by NASA planners, includes a staggering list of projects ranging from a satellite carry-

The seven astronauts in NASA's Project Mercury look over the Fiberglas and plaster molds used in the development of the couch on which one of them will ride in an orbiting space capsule.

ing a cesium clock to test Einstein's theory of relativity, to the establishment of an exploration base on the moon and instrumented examination of the rings of the Planet Saturn.

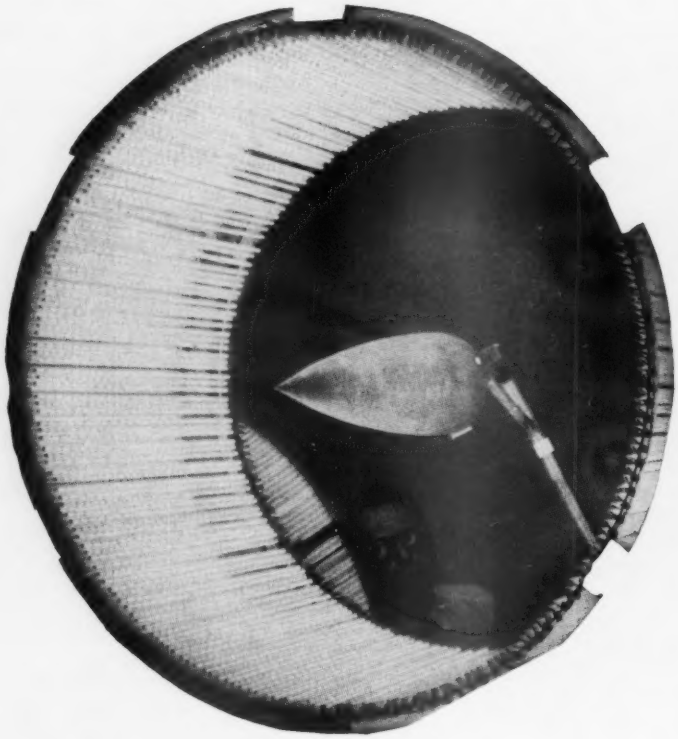
From the apex of the administrative pyramid in Washington, NASA spreads out to "in house" research and development centers, to space vehicle launching and tracking sites, to universities and government research installations, and to an ever growing segment of the so-called "space industry." NASA's own major properties include the $140 million Langley Research Center in Tidewater, Va., the Ames Research Center in the San Francisco area, the Lewis Research Center in Cleveland, the High Speed Flight Station in Edwards, Calif., the Beltsville Space Center in Beltsville, Md., the Jet Propulsion Laboratory at the California Institute of Technology, the Pilotless Aircraft Research Station on Wallops Island, Va., and the Plum Brook Research Reactor facility near Sandusky, Ohio.

To this listing will soon be added the Goddard Space Flight Center at Greenbelt, Md. Here engineers and scientists will engage in basic space research and will be responsible for the development of satellites, space probes and vehicles, tracking, communications, and data reduction systems. The Goddard Space Flight Center will eventually become the command control center for all NASA space flight operations, including manned voyages to the moon and to the planets.

Out of these research centers—staffed mostly by engineers and individuals who refer to themselves as applied scientists—is emerging a bewildering stream of projects related to boosting man and his instruments out of the earth's atmosphere. NASA is deeply involved in the X-15 rocket powered, hypersonic aircraft, and is responsible for the management and technical direction of Project Mercury, which will attempt to put a man in a satellite capsule, orbit him around the planet and bring him back to earth.

Project Mercury might be taken as foreshadowing the way space will be explored and the type of people who will do the exploring. All of the seven astronauts selected for the manned satellite project have an engineering background. Their engineering knowledge was a definite factor in their selection, and their engineering competence will be a factor in the ultimate evaluation of the equipment and instruments used in the re-entry satellite capsule.

THE complexity and the engineering involvement of the national space program can be followed month by month in the contracts written by NASA. During a recent month, NASA executives signed contracts totaling $27.6 million, with a $24 million slice going to Douglas Aircraft for Delta, a 3-stage launching vehicle. Some of the other contracts for the month went to: Massachusetts Institute of Technology, $50,000, for the development of a cesium vapor atomic clock, and gamma ray detection instruments; University of Maryland, $60,000, to investigate the forces between atoms, molecules, and ions; Itex Corporation, $170,000, for development of upper-atmosphere sounding rocket instruments; New York University, $100,000, to instrument two Aerobee-Hi rockets for neutron intensity measurements; Army Ordnance Missile Command, $150,000, radiation satellite payloads; University of Chicago, $300,000, to build cosmic ray measuring instruments; General Mills, $60,000, for nine 100-foot diameter plastic balloons for communications satellite tests; Radio Corporation of America, $60,000, for Mercury ground tracking and instrumentation studies; American Potash & Chemical Co., $50,000, for 161,000 pounds of ammonium perchlorate for solid research; Rensselaer Polytechnic Institute, $80,000, for mathematical investigation of control systems; Rice Institute, $150,000, for wind tunnel studios and



NASA engineering research on hypersonic flight vehicles is typified in this test of a missile nose cone exposed to simulated aerodynamic heating conditions at Langley Field, Virginia.

research into physics of solid materials at high temperatures; General Electric Company, $50,000, to furnish two telemetry and beacon antenna systems for Project Mercury; Cincinnati Testing & Research Laboratory, $80,000 for tests on Project Mercury capsule heat shield, and Air Materiel Command (Air Force), $120,000, for five pressure suits for use in Project Mercury tests.

In the area of heavy thrust rockets, NASA has contracted with Rocketdyne for the design and development of a 1½-million-pound thrust engine. Although this massive device is an estimated two to four years away from operational status, NASA engineers have announced plans to cluster four of these engines in the Nova to obtain a total thrust of six million pounds.

To direct and administer its far-flung space activities, NASA has what must be by far the most science and engineer weighted executive staff in any government agency. At the top is T. Keith Glennan, first administrator, an electrical engineering graduate. Dr. Hugh L. Dryden, deputy administrator, is an internationally known scientist who headed the National Advisory Committee for Aeronautics for eleven years. Of the ten other top NASA executives, nine are either engineers or applied scientists. A mechanical engineer, A. Silverstein, is in charge of the entire NASA space flight development program.

In the general confusion and alarum sounding after the Russian Sputniks, one of the most telling criticisms of America's space efforts was that the nation had no over-all specific and organized program other than the projects of the several military services. With the formulation of the NASA Space Sciences Program, the problem has shifted to the amount of support Congress and the Administration will give in terms of financing, and the forcefulness, of decisions from the Administration as to what specific projects should be given all out and immediate implementation.

The Space Sciences Program was worked out by a group of scientists in NASA's Office of Space Flight

NASA engineers at the Lewis Flight Propulsion Laboratory in Cleveland check design characteristics of a semi-blunted model of a missile nose cone. Machine-ground and hand-polished, the nose cone will be mounted on a rocket-propelled vehicle for free flight study.

Development. In thirty-one single-spaced typewritten pages, the Space Sciences Program asks a goodly share of the major questions scientists would like to have answered about outer space. After the questions, the NASA scientists propose long-range and immediate programs. In these latter proposals can be seen the basis for a blueprint of America's space activities—except for the wholly military projects—over the next several years. And the blueprint, if carried out, points to a steadily increasing outer space involvement on the part of the engineering profession.

The NASA Space Sciences Program is divided into seven sections: atmospheres, ionospheres, energetic particles, electric and magnetic fields, gravitational fields, astronomy, and biosciences. The questions about atmospheres, for example, which scientists would like to have answered are listed in the Science Porgram as:

1. What are the major constituents of the planetary atmosphere?
2. What are the surface pressures and densities?
3. What is the altitude variation of their atmospheric structures?
4. What are the atmospheric components that might support earthtype life?
5. Do their atmospheres contain oxidizers available for combustion?
6. Does Venus's atmosphere contain H_2O?
7. Of what does the cloud cover of Venus consist?
8. What causes the apparent changes in transparency of the Martian atmosphere, the so-called "blue clearing?"
9. What is the nature and cause of the famous red spot on Jupiter?
10. What is the nature and origin of the rings about Saturn?
11. What are the important dynamic features of these atmospheres?
12. Does Pluto have an atmosphere?

To answer these questions, NASA planners propose a long-range program which includes:

Instrumental satellite stations around other planets.

Rocket probes deep into the atmospheres of other planets including soft landings onto the surface with automatic and eventually manned recording stations.

Probes deep into the solar atmosphere.

Special probes for measuring the density and nature of gas and dust particles in interplanetary space and within comets, and

Extensive theoretical studies to understand the basic natural phenomena taking place within the atmospheres.

EACH of these five long-range proposals, must be ultimately translated into the engineering of the actual instruments, heavy rocket engines, and other "hardware" necessary to get out into the planetary atmosphere. In the long-range NASA Space Sciences Program for astronomy the engineering role is likewise evident:

"To provide the necessary point-

Engineers in every specialized field are being called on to design and test the component parts for rocket engines, instruments, and structures for space exploration vehicles.

ing accuracy and observing time for experiments in the infrared, optical, ultraviolet and X-ray regions of the spectrum, development has begun on an orbiting stabilized platform. It will be possible to point this platform toward any point in the sky and to hold it in that direction for periods from a few minutes to an hour with sufficient accuracy to allow continued observations of individual celestial objects. The satellite will contain instruments of moderate size which can be completely controlled from the ground, thus providing a remotely operated observatory which can perform most of the functions of a ground-based observatory. Although the sky above the earth's atmosphere will be dark, the presence of sunlight scattered within the vehicle itself may be disturbing. The eventual establishment of an astronomical observatory on the moon will eliminate this difficulty, since the moon itself can provide an effective shield against the sunlight. Moreover, the establishment of an observatory on the moon will undoubtedly make feasible larger equipment than can be placed on a satellite borne platform. The execution of these programs will require not only the development of a stabilized platform and its pointing controls, but also specialized optical equipment and radiation receivers for particular wavelength regions, especially adapted for a particular program, and improvements in telemetering techniques so that transmission to ground stations of spectroscopic data of adequate scope and resolution will be possible."

Turning to the problems of energetic particles, the NASA long-range proposals include:

"In situ measurements using deep space probes will be made from the close proximity of the sun to the limits of the solar system. Extensive measurements in the vicinity of the planets, especially the earth, will be made to determine the interaction of the energetic particles with the atmospheres and fields of these bodies. These measurements will require satellite orbits around the earth, the moon, and other planets. The establishment of an observatory on the surface of the moon or on some other planet might be necessary, depending on the data previously acquired by artificial satellites."

Working groups have been appointed by NASA to begin outlining the specific approaches suggested in the Space Sciences Program. To date, such working groups have been set up for satellite beacons, orbiting astronomical observatories, and lunar explorations. The latter group will correlate experiments in these general areas:

1. Probes and orbiters: payload packages designed to obtain information on the lunar environment. (i.e., extent of the lunar atmosphere, magnetic fields, interplanetary plasma, fluxes of energetic particles and beta and gamma rays emanating from the moon's surface.)
2. Advanced orbiters: satellites circling the moon and instrumented to give data on the shape and mass of the moon and structure of the lunar surface.
3. Hard landings: instrumented packages containing devices such as seismographs and magnetometers to measure properties of the lunar surface. The payload will be packaged to survive impact on the moon.
4. Soft landings: payload packages containing more delicate instruments such as X-rays and television cameras. Retrograde, or reverse, rockets will be used as brakes in the soft lunar landing.

But while NASA scientists and engineers can provide adequate plans and equipment for a wide variety of space exploration projects, a single Federal agency cannot itself order and direct the United States to place instrumented satellites around the moon, for example, or begin an immediate expedition to Mars. Such ordering and direction can come only from the Administrative branch of the Federal Government. In the bustling corridors and offices of NASA headquarters in Washington, there is no lack of a sense of urgency. Speaking at a space exploration colloquium at California Institute of Technology, Administrator Glennan said he saw the job of running NASA as "one which must be carried on with a sense of urgency similar to that which kept many of us at our desks and in the laboratories seven days a week during World War II."

THE report released last month by the Senate Space Committee in-

(Continued on page 47)

A miniature tape recorder, which relays a global picture of the world's weather, was sent into orbit in NASA's cloud cover satellite.

Space vehicle instrumentation is a prime responsibility of NASA engineers as satellites become orbiting laboratories for gathering data in a wide variety of projects.

Strictly Business

Personalities . . . **George Russell** has been promoted from assistant to chief engineer of **Amchem Products, Inc.** Ambler, Pa. . . . **Everett P. Welch** has been appointed manager of **Pennsylvania Power & Light Company's** Engineering Services Department, Allentown, Pa. . . . **The Asphalt Institute,** College Park, Md., has announced the appointment of two district engineers. **Lawrence K. Murphy** has been assigned to the New England area, and **Herbert C. Higgins** to the States of Washington and Alaska . . . **Robert G. Hargrove** has joined **Badger Manufacturing Company,** Cambridge, Mass., as a project engineer . . . **Peter B. Heidema** is engaged as a soils engineer on the International Passamaquoddy Tidal Power Survey . . . **E. Albert Wagner,** former manager of development engineering at the **Exide Industrial Division** of **The Electric Storage Battery Company,** Philadelphia, Pa., has been named manager of Exide's service engineering division . . . **J. Kenneth Koster** has been named manager of production and engineering at the Calvert City, Ky., general chemical plant of **B. F. Goodrich Chemical Company,** a division of **The B. F. Goodrich Company.**

Mr. Russell

Frederick S. Kent, sanitary engineer director, has been named regional program director for engineering activities in the San Francisco regional office of the **Public Health Service. Frederick F. Aldridge,** senior sanitary engineer, has been transferred from the San Francisco office to the position of chief sanitary engineer for the Division of International Health, Bureau of State Services, Washington, D.C. . . . **Paul T. Juul** has been named chief industrial engineer of **Friedrich Refrigerators, Inc.,** San Antonio, Tex. . . . **Midwest Technical Service,** Downers Grove, Ill., has announced the addition of **Howard F. Modjeski** to its engineering staff . . . **H. R. Drew** has been elected executive vice president of the **Texas Atomic Energy Research Foundation . . . Donald B. Kimball** has retired from the Kodak Parks Works plant of **Eastman Kodak Company,** Rochester, N.Y., after thirty-one years of service . . . **J. E. Lonergan Company,** Philadelphia, Pa., has appointed **Harold I. Gregg** as a design engineer . . . **William W. Davis** has been appointed prestress planning engineer for Leschen Wire Rope Division, **H. K. Porter Company, Inc.,** St. Louis, Mo.

Mr. Juul

Donald D. Meisel has been elected to the board of directors of **Ambric Testing and Engineering Associates, Inc.,** Philadelphia, Pa. He has also been named chief engineer of the firm . . . **William R. Ganser, Jr.,** has been promoted from engineering assistant to staff engineer of the **American Institute of Timber Construction,** Washington, D.C. . . . **Harold C. Hanson** has been appointed assistant chief engineer of **Magnetic Controls Company,** Minneapolis, Minn. . . . The appointment of **Victor Frederiksen** to the central staff of **Detroit Harvester Co.,** Detroit, Mich., as manufacturing engineer has been announced . . . **Wilson Bradley, Jr.,** vice president and general manager of **Endevco Corporation,** Pasadena, Calif., has announced several recent appointments as field engineers for the firm. They are: **Roger Tengwall,** Middle West States; **Frank Benedict,** Central States; **Sherman DeVeas,** Southern States; **Ralph Hart,** New England States, and **Stanley Emery,** New Mexico, Arizona, and part of California . . . **Fred W. Drosten** has been named director of metallurgical development for the **Heavy Minerals Company,** Chattanooga, Tenn.

Mr. Hanson

J. Samuel Gillespie, Jr., has been made a partner in the new firm of **Cox and Gillespie,** Chemists and Chemical Engineers, Richmond, Va. . . . **The Daven Company,** Livingston, N.J., has announced the appointment of **Emil Kohler** as a project engineer . . . **Malcolm C. Myers** has been named manager of product engineering and development for **OPW-Jordan,** Cincinnati, Ohio . . . **Leland E. Bruce** has been advanced to the position of assistant production manager of the Chemical Milling Division of the **United States Chemical Milling Corporation,** Manhattan Beach, Calif . . . **Charles W. George** has been appointed manager-engineering for the **General Electric Company's** Gas Turbine Department, Schenectady, N.Y. . . . **John E. Erskine** has been elected president of **Racine Hydraulics & Machinery, Inc.,** Racine, Wis. **George B. Miller,** formerly vice president in charge of engineering, has been named executive vice president of the firm . . . **Charles R. Foster** has joined the staff of the **National Bituminous Concrete Association,** Washington, D.C., as coordinator of research.

Mr. Myers

Point Four Program Celebrates Its 10th Birthday This Year

TEN years ago the U. S. sent a new missionary—the engineer—abroad to carry American technological and scientific skills to the underdeveloped nations of the free world.

The program known as Point Four, or by its newer name of Technical Cooperation, celebrates its tenth birthday this year with nearly 7,000 American technicians scattered in virtually every corner of the world.

Today, demands on the Technical Cooperation program are at their highest point with the governments of fifty-four underdeveloped nations participating. To meet the growing needs of these rapidly awakening nations, Congress is expected to appropriate a record budget of $179.5 million for technical cooperation in the next fiscal year.

The Shah of Iran cuts a ribbon to start the flow of water from the Kuhrang River through the Kuhrang Tunnel under the Bakhtiari Mountains and down the Valley of the Zayendehrud. The project was completed with the help of America's foreign aid program.

Cold statistics don't begin to tell the drama of the engineers' role in bringing 20th Century skills and techniques to impoverished nations, Point Four engineers have taught Asians new mechanical methods for agriculture; they've brought modern sanitation to Latin American countries; they've taught new methods of highway construction to the Turks; helped the Middle East discover and develop new water supplies; aided in rehabilitating South Korea's war-torn hydro-electric system, and they've taken 20th Century industrial techniques to dozens of countries.

Unlike some of the grandiose and more highly publicized parts of the U. S.'s foreign aid efforts, Technical Cooperation has been carried out on a fairly modest financial basis. This year President Eisenhower is asking nearly $4 billion for the total Mutual Security Program with Technical Cooperation making up only $179.5 million of the total.

Technical Cooperation is primarily a person-to-person contact program for the interchange of technological skills—to help each other adapt and use knowledge to achieve a greater productivity and utilization of resources. It does not include economic aid, military assistance or public loans or grants. However, technical assistance usually increases the effectiveness and provides a basis for direct money grants and loans. It serves to supplement other Mutual Security Programs as well as non-ICA U. S. Government programs such as the Exchange of Persons under IES; non-governmental activities of U. S. private institutions, organizations, and business firms.

Technical Cooperation programs are primarily organized in the form of jointly agreed projects. They may involve simply sending one or a few people from a country to the U. S. for a few months to observe advanced methods in their particular field of interest; or they may involve a long-term, comprehensive group of activities designed to achieve a major objec-

Indian and American engineers worked closely on the Hirakud Dam project completed in India several years ago. At the left is Clifford Mutch, sent from the Bureau of Reclamation to serve as chief construction engineer. At right is Kanwar Sain, chief engineer, of India's Central Water Power, Irrigation and Navigation Commission.

tive, such as the development and staffing of a highway department or an agricultural extension service or a reclamation bureau.

In many cases the Point Four engineer may work in the field teaching individual engineers and technicians new methods of production or construction. In other cases he may be called upon to advise on technical programs at the cabinet-officer level.

Obscured behind the headlines of gigantic dollar grants, Technical Cooperation has probably never received its just credit as one of this country's most imaginative and effective foreign policy programs in the Cold War.

Dr. Donald C. Stone, dean of the graduate school of Public and International Affairs of the University of Pittsburgh, pointed up this fact in testimony before the House Foreign Affairs Committee this spring:

"There has not been, in my view an adequate appreciation of the constructive things you can do under technical assistance to develop not only technical skill and methods but also the attitudes, the values and approaches that are at the heart of what we are talking about. Technical assistance opens the door for those human relationships which best demonstrate what we are as Americans."

The United States contributed engineering know-how to make this big irrigation project possible in India. The dam was completed several years ago on the Hirakud River with the U. S. furnishing the technical knowledge and the earth moving equipment. The Indian government spent $175 million on the project.

TECHNICAL COOPERATION or Point Four, of course, is not a program concerned solely with engineering skills and techniques. There are medical men, educators, agricultural experts, and other technicians standing shoulder to shoulder with the engineer.

But, much of the immediate need of many of the world's under developed countries is in the field of engineering and the program has always been looked upon as a major challenge for the engineering profession.

In 1951, during the early days of the program, the late Dr. Henry G. Bennett, at that time administrator of Point Four, told the NSPE convention at Minneapolis:

"When we stop to think of how dependent we Americans are on engineering and how much the engineer has contributed to our modern society, we begin to realize that the gap between our conditions of life and those in some other parts of the world is mainly a gap in engineering skills.

"The Point Four program is designed to bridge that gap by making some of our knowledge and skill available to other people in their struggle for a better life, so it is obvious that the various branches of engineering must play an important part in this effort."

THERE have been some changes in the Point Four program since that 1951 convention. The program is now officially known as Technical Cooperation dropping the Point Four designation given it by President Truman in 1949. It has also lost some of its separate identity and is now lumped in the ICA along with other mutual security programs such as loans, military assistance and economic aid. But, the basic principles—of sharing our technical knowledge—remain intact.

The program, of course, is not just a big humanitarian gesture on the part of the U. S. It has its selfish purposes. It was obvious when the program was launched in 1949 that the world's free nations had a lot better chance of remaining free if they had a growing, healthy economy and a rising standard of living. Poverty, disease, and ignorance are fertile grounds for Communism. Outside of the Cold War aspects, Technical Cooperation has the long-range effect of creating new profitable markets for American products.

Foreign aid, particularly of the economic variety, has come under varying attacks in its annual trip through Congress. Despite the attacks, Technical Cooperation has grown slowly, but steadily.

The program got a particularly favorable report from the majority after the House Foreign Affairs Committee completed its hearings last month. Here's what the Committee had to say on Technical Cooperation:

"Bilateral technical cooperation programs are carried out in 49 countries and 9 territories. They are the most widespread, the least costly, and, in many ways, the most effective of all the programs conducted under the mutual security legislation."

THE HOUSE version of the new Mutual Security Act calls for $179.5 million with major increases for expanded programs in Africa and Latin America. In addition the bill would authorize a $30 million contribution to the United Nations

America's technical cooperation helped to complete this water project in Iran. Water from the Kuhrang River of Iran is shown flowing out of the Kurhrang Tunnel into the wide fertile Valley of the Zayendehrud where it is irrigating thousands of acres of farmland.

technical assistance program and $1.5 million to the technical aid projects of the Organization of American States.

At the present time, the U. S. has 6,826 technicians overseas. In addition 9,880 foreign nationals were brought to the U. S. for technical training in the last fiscal year.

Russia didn't get into its technical cooperation program until 1954, but it is now rapidly expanding activities in this area. The State Department estimates that about 2,800 Sino Soviet Bloc technicians were working outside of the bloc itself in late 1958. The figure is expected to increase substantially in the coming year. Nearly ninety per cent of the Soviet technicians are concentrating their efforts in the United Arab Republic, Yemen, Afghanistan, India, and Indonesia. Most of the Soviet program to date has been primarily concerned with physical construction type projects rather than the long-range efforts of establishing institutional foundations which typify the U. S. approach to Technical Cooperation.

With domestic demands for engineers and other technicians running high, expansion of the U. S. program is keyed to the government's ability to recruit personnel with the skills and qualities necessary for the overseas work.

Most of the work is in underdeveloped countries which don't always provide first-class living conditions for the technician and his family. The school facilities normally required by the families of mature specialists are rarely available. But, probably more important are the questions of tenure of the ability to develop a true career when the program is on a year-to-year basis.

AT the urging of Congress the ICA stepped up its recruitment activities last year and instituted new personnel systems. In testimony before the House Committee, ICA chiefs said the changes in recruitment had provided a net gain of 380 filled positions overseas during the first eight months of fiscal year 1959 as compared with a gain of only 105 positions in 1958.

The difficulties of recruitment are heightened by the special requirements of the program. Professional expertism is not enough. Successful employees must also have a special competence in the art of transmitting technical know-how. And they and their families must be able to adapt readily to living and working in foreign environments with strange cultures.

American technical know-how can't always be transplanted in wholesale lots to the new cultures. The technician must be skilled at adapting our methods if they are to be practicable and workable in the foreign countries. The shovel, so common to the United States, is a graphic example. In much of Asia, the digging spade is virtually unknown. Digging is done with a broad-bladed hoe. Though this is done with dexterity, it remains an awkward process in many circumstances. It would seem simple to substitute the spade, but it turns out that the ordinary digging spade cannot be used with sandals or bare feet and that if the spade is constructed with a broad blade, the top, upon which the foot, the bare foot can press, then dirt sticks to it and the spade will not release its load. Thus, even the simple spade cannot be easily adopted by a barefoot society.

John Lester Lane, U. S. Bureau of Public Roads equipment specialist, instructs Philippine workers on the repair of a damaged tread of a caterpillar.

The world's barefoot nations are becoming more and more vocal in their demands for economic freedom. No longer are they willing to sit in poverty, carrying on their day-to-day living with 18th Century tools and techniques.

In many cases the survival of democratic governments depends on their ability to successfully meet these new demands. America has accepted a big challenge in attempting to help these nations find their way into the 20th Century. If the challenge is successfully met, the American engineering profession can claim a major part of the credit.—End.

New Literature

TRANSIT MIXERS—A colorful, new "fact portfolio" combining features, specifications and action photographs into a graphic presentation of the company's line of transit mixers has just been made available by the

Transit Mixer Division of Hercules Galion Products, Inc. The portfolio presently contains "pockets" for specification sheets and a 16-page booklet which utilizes large, cutaway drawings, diagrams, and actual photographs to point up the performance of the transit mixers and the weigh batcher-loading conveyor combination which makes up the company's Portable Batching Plant. The literature gives full details on three lines of transit mixers: S-Series "Separatengine" models in 5, 6, and 7-yard capacities; M-Series "Mixomatic" models with front-of-engine PTO drive in 5, 6, and 7-yard capacities and the T-Series Straight PTO drive in 4-yard capacity. A separate catalog sheet describes the Portable Batching Plant.

(Circle 16 in Readers' Service Dept.)

TUBING & FACILITIES — Ohio Seamless Tube Division of Copperweld Steel Company has issued a revised version of their 14-page tubing and facilities catalog. The booklet describes carbon and alloy seamless steel tubing in mechanical, pressure, aircraft mechanical and airframe grades. An unusual 3-page foldout flow chart illustrates major steps in seamless steel tube production. Contents also cover electric welded carbon steel tubing in mechanical and pressure grades, forging and fabricating operations, special tubular shapes, and other pertinent information.

(Circle 17 in Readers' Service Dept.)

ELLIPTICAL CONCRETE PIPE — A 4-page brochure in color entitled "Elliptical Concrete Pipe for Sewers and Culverts" is being made available by the United States Concrete Pipe Company. The brochure is of interest to engineers, contractors, municipal officials, and others concerned with planning, designing, and constructing sewerage and drainage systems. It contains fully illustrated descriptions on the use of elliptical pipe to obtain round pipe flow equivalents in areas where either shallow or narrow trenches make use of full round pipe impractical. Diagrams, data charts, and tables fully describe elliptical pipe sizes, and computes discharge flow rates for the full range of pipe sizes.

(Circle 18 in Readers' Service Dept.)

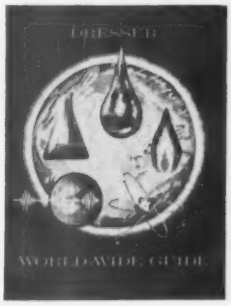
CONCRETE QUALITY CONTROL —A 6-page folder on the "Three Basic Tests for Concrete Quality Control" is now available from Soiltest, Inc. The leaflet shows how the slump test, air entrainment determination, and testing of concrete cylinders is performed. Photographs illustrate the major steps in each testing operation. In addition to the equipment needed to perform the specific tests, there are other illustrations of testing equipment pertinent to the concrete quality control field.

(Circle 19 in Readers' Service Dept.)

RUBBER GASKET JOINT — A method of joining large diameter steel water pipe, by employing a rubber gasket joint instead of field welding, is described in a booklet published by Kaiser Steel Corporation. The booklet describes how the joint can be used in coupling pipe ranging from thirty-six inches to 120 inches in diameter or larger. The joints permit rapid installation in the field and provide a watertight coupling which will give unlimited years of service without maintenance, according to the manufacturer. Included in the pamphlet are cross section drawings of the joint, specifications, and details on how pipe sections employing the joint are installed.

(Circle 20 in Readers' Service Dept.)

DRESSER GUIDE — The 1959 edition of Dresser Industries' "World-Wide Guide to Dresser Equipment and Technical Services" has been published. The colorful, 68-page book is profusely illustrated and provides



reference to the many products and services supplied by the Dresser group of companies throughout the world. Convenient lists of Dresser representatives and their addresses in various countries are also included. Hundreds of products and services, in seventy-seven categories ranging from amplifiers to well completions, are detailed. A pictorial section at the back of the new "World-Wide Guide" gives an interesting display of Dresser equipment on the job throughout the world.

(Circle 21 in Readers' Service Dept.)

ALUMINUM WELDING — A comprehensive survey of the techniques of welding aluminum using Air Reduction's Aircomatic (gas-shielded metal-arc) and Heliweld (tungsten-inert-gas) processes has been issued by Air Reduction Sales Company. This 120-page spiral bound book—entitled "Aircomatic and Heliwelding of Aluminum"—thoroughly covers the entire subject from a brief historical note on the first uses of these processes for welding aluminum to the highly specialized aluminum fabrications which are being welded with them today. Major topics covered include: weldability of aluminum and its alloys, definitions and technical discussions of the two welding processes, selection of the proper process for certain job applications, descriptions of manual and automatic equipment, welding power supplies, and safety practices.

(Circle 22 in Readers' Service Dept.)

These listings are informational only and are not an endorsement of the products, nor of the manufacturer's claims. To receive any of the new literature described in this column, merely circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

NSPE Rejects Invitation to Join EJC at Annual Meeting

- Ryan Honored; 'Ambassadors' Named
- Past Presidents Attend 25th Session

An invitation to join the Engineers Joint Council has been rejected for the second time by the National Society of Professional Engineers.

Meeting for its 25th anniversary at New York City June 17-20, the NSPE Board of Directors expressed its sincere appreciation for the invitation but recommended that the Society "not apply for membership in the EJC at this time. . . ."

During the four-day stand at the Hotel Commodore, the NSPE directors also:

- Presented the 1959 NSPE award to William F. Ryan, former vice president of Stone and Webster Engineering Corporation, for "outstanding service to the profession."
- Named Rodney D. Chipp and his wife, Dr. Beatrice Hicks, to make a month's tour of South America in the Society's Project Ambassador program.
- Honored 13 of the 16 living past presidents and heard the Society's first president, D. B. Steinman, make an emotion-filled review of NSPE's 25 years of growth.
- Heard Granville M. Read, chairman of the Society's Board of Distinguished Consultants, warn that "unions represent a restraining form of regimentation which is antipathetic to the training and objectives of our profession."
- Heard retiring president Dr. Clark A. Dunn urge that the Society select policies and procedures "that will not only prove to be in the best long-term interest of individual engineers but that will also enable the people of this nation to satisfy their social and economic needs."
- Took a broad swipe at the Administration's opposition to separate classifications for engineers and scientists in government jobs.
- Launched plans for enlargement of the NSPE scholarship program which this year provided five high school seniors with $3,000 for their engineering education.
- Approved plans by the Professional Engineers Conference Board for Industry for a new survey in the general area of "What Professionalism Means to the Engineer in Industry."

Mr. Chipp, director of engineering at ITT Communications Systems, Inc., Paramus, N.J., and his wife, Dr. Hicks, president of Newark Controls Company, Bloomfield, N.J., were announced as the ambassadors at the opening dinner honoring the Board of Distinguished Consultants. The two will tour South America next March on an engineering fact-finding and goodwill trip.

Earlier, Mr. Read, retired chief engineer of E. I. du Pont de Nemours and Co., told the gathering that "today's engineer is one of industry's most valuable assets . . . and has gained a permanent berth on management's team.

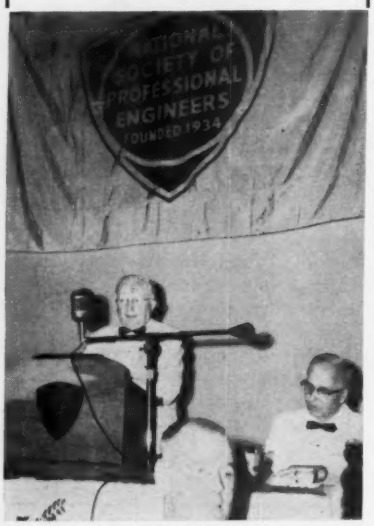
"Industry's profit and loss statement to a large degree is determined by the competency of its engineering staff," he said. "Industry must make sure that the opportunities and rewards for the engineering specialist are commensurate with the opportunities and rewards of those in straight line organization."

Mr. Read voiced apprehension over the efforts being made to organize engineers for the purpose of collective bargaining. "You may well ask me why I fear unionization of engineers," he said, "since unions today are a well accepted part of the American way of life. It seems to me that in the case of engineering, a union would rep-

Exposition Opened

The Engineering Progress Exposition is opened at the NSPE meeting by the use of General Electric's newly perfected fuel cell. Shown, l.-r., are: NSPE President Clark Dunn; NYSSPE President Leigh St. John, and Carl H. Reker, general meeting chairman.

Ryan Speaks



William F. Ryan accepts the NSPE 1959 Award at a banquet on the closing night of the meeting.

resent a restraining form of regimentation which is antipathetic to the training and objectives of our profession.

"As an engineering executive, I am not opposed to collective bargaining, and I have engaged in it with the craft unions over a period of many years. What I do oppose is the restraint which unionization inevitably would place upon professional people. This could well retard human progress to a greater degree than technologly has advanced it.

"What we have gained, let us maintain. Let us not permit any union leader to invade our technological stockpile," he said.

This theme of the unions' threat to professionalism cropped up throughout the four-day session in speeches, committee reports, and in comments from the floor.

Harry P. Cooper, of Lake Jackson, Tex., chairman of the Engineers-in-Industry Subcommittee, said recent statements by AFL-CIO leaders indicated that labor may be planning to enter professional activities which have been previously recognized as the responsibility of professional societies.

He urged that the directors alert their state and local chapters on the possibilities of union intervention. "It is vital that we know of organized unionization efforts before the time for effective professional action has passed," Mr. Cooper told the directors.

Leigh St. John, president of the New York State Society of Professional Engineers, said that "present attempts by the American Federation of State, County and Municipal Employees, AFL-CIO to unionize professional engineers employed by New York City should be regarded as the first step in a national campaign which could have serious consequences."

Mr. St. John said that the present situation began with an executive order issued by Mayor Wagner last year which permits city employees to select representatives for collective bargaining. "The threat to professional engineering employees, as well as other professionals," he said, "stems from the failure of the Executive Order to provide any procedure for separate voting for professionals so that their rights can be protected. Otherwise they conceivably could be included in a voting unit composed predominantly of nonprofessional employees."

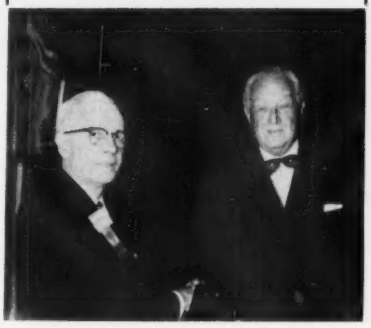
The New York Society has chartered a functional section of engineers in the New York City Public Service for the purpose of encouraging professional engineering employees of the city to adopt a professional approach toward employments interests and to ward off attempts by unions to organize them for collective bargaining purposes.

Just what professionalism means to the engineer in industry will be looked into by the Professional Engineers Conference Board for Industry, it was decided.

The new theme is based on results from a questionnaire which was sent earlier this year to subscribers of the Employment Practices Newsletter. The survey will be the first by PECBI since 1956 when it turned out a report on "Career Satisfactions of Professional Engineers in Industry."

In addition to selecting the new research project, the PECBI reelected C. Y. Thomas, vice president of Spencer Chemical Company, of Kansas City, Mo., as its chairman. It named W. K. Adkins, chief engineer of the Firestone Tire and Rubber Company, of Akron, Ohio; G. W. McCullough, manager of the natural gasoline department, Phillips Petroleum Company, of Bartlesville, Okla., and William F. Ryan, retired vice president of Stone and Webster Engineering Company, of New York, as vice chairmen. Paul H. Robbins, executive director of NSPE, will serve as secretary and Charles F. Savage, consultant in engineering professional relations of General Electric Company in New York City, as treasurer.

Presents Certificate



President Dunn presents a "Certificate of Appreciation" to Granville M. Read, chairman of the Board of Distinguished Consultants.

New officers pose at NSPE's annual meeting. Front row, l.-r., are: Mr. Hull, vice president; Mr. Mosher, president; Mr. Dunn, past president; Mr. Christian, vice president. Back row, l.-r., are: Mr. Robbins, executive director; Mr. Allen, treasurer, and Messrs. Easley, Zelhart and Rouse, vice presidents. Vice President Backlund was absent at time of photo.

Past and Present

Outgoing President Dunn congratulates the new president, Harold A. Mosher.

Friday' session was taken up with panel discussions and functional section meetings.

J. Carlton Ward, president of Vitro Corporation of America set the stage for the day's discussion with a talk on "The Merging Role of Engineering and Science for our Technological Economy" at a noon luncheon.

In the afternoon, James F. Fairman, senior vice president of Consolidated Edison Company of New York, Clarence H. Linder, vice president of General Electrict Company, and John C. Calhoun, vice president for engineering at Texas A&M College, went further into the subject during a panel discussion.

During his remarks, Mr. Linder said that science accomplishes the job of making things known while engineering provides the know-how that makes the discovery useful. Mr. Calhoun, meanwhile, said he thought the individual identity of scientists and engineers should be kept in the public mind.

Mr. Fairman, who served as moderator, indicated that he felt there was a definite trend toward merging many of the roles of the two fields. In backing up his statements, he recalled concepts of team efforts by engineers and scientists during World War II.

The Society's new president, Harold A. Mosher, of Rochester, N.Y., took office at the banquet on the closing night. Installed with him were the vice presidents: W. Earl Christian of Westfield, N.J., Northeastern Region; R. King Rouse of Greenville, S.C., Southeastern Region; L. Eugene Easley of Indianapolis, Ind., Central Region; Brandon H. Backlund of Omaha, Neb., North Central Region; Noah E. Hull of Houston, Tex., Southwestern Region, and George E. Zelhart of Fresno, Calif., Western Region. Russell B. Allen of College Park, Md., was installed for his twelfth term as treasurer.

Installation of the new officers shared the final night's spotlight with presentation of the NSPE award to William F. Ryan for outstanding service to the engineering profession. He is a former vice president and national director of NSPE as well as past president of the American Society of Mechanical Engineers and the Massachusetts SPE. He has served as chairman of several national committees of NSPE. Mr. Ryan joined Stone and Webster Engineering Corporation in 1929 as a mechanical engineer. He assumed the duties of engineering manager in 1948, advancing to vice president in 1950. He also served as a director of the corporation before his retirement last year.

The rejection of EJC's invitation came on recommendation of the Inter-Society Relations Committee. The Committee listed three prime reasons for the move:

1. None of the ten objectives of EJC make reference to what is generally termed the "professional matters," while the NSPE, itself, is concerned only with "the professional, social and economic interest of the professional engineer." Seven of the ten objectives of the EJC, the Committee pointed out, specifically mention "the art and science of engineering." NSPE, on the other hand, has very carefully refrained from entering any of the fields of "the art and science of engineering."

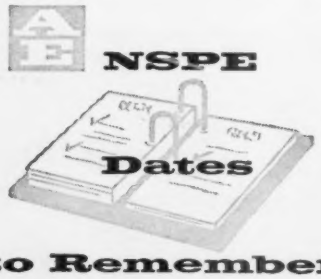
2. The objectives of EJC provide that "no substantial part of the activities of the corporation (EJC) shall be the carrying on of propaganda or otherwise attempting to influence legislation." An important activity of NSPE is concerned with legislation affecting the engineering profession and, therefore, their activity would be contrary to the objectives of EJC.

3. A question might well be raised as to whether or not under the stated objectives of both organizations, NSPE could properly pay dues into EJC. A large percentage of NSPE's members are now represented in and pay dues to EJC through technical societies, and should NSPE also affiliate with EJC, this would mean that NSPE members would actually be paying dues to EJC through both their technical societies and their professional societies. Many NSPE members could well question the fairness of being assessed such a duplication of payments by one organization.

In listing other reasons why it felt the affiliation unwise, the Committee said:

". . . That the weaknesses of EJC are those inherent to a federation of societies; that the affiliation of NSPE with EJC would add a few dollars to woefully inadequate financial coffers and could in no way give additional finances to the constituent societies of EJC so that they could afford to appropriate more money to it; that the weak financial foundation of a federation of societies was demonstrated in the failure of the American Engineering Council several years ago; that the affiliation of NSPE could in no way solve the tax status problem of EJC, nor could it affect the remoteness of EJC from the individual grass-roots engineer—except possibly as NSPE might publicize EJC to its own members through its own organization of its directors. It is difficult for many engineers to see how the

(Continued on page 40)



to Remember

Mississippi Society of Professional Engineers — Semi-Annual Meeting, July 23-25, 1959, Buena Vista Hotel, Biloxi, Mississippi.

Wisconsin Society of Professional Engineers—Summer Meeting, September 18-20, 1959, Dellview Hotel, Lake Delton, Wisconsin.

National Society of Professional Engineers—Fall Meeting, October 15-17, 1959, Penn-Sheraton Hotel, Pittsburgh, Pennsylvania.

Past Presidents Honored at 25th Anniversary; Steinman Speaks

Thirteen of the sixteen living past presidents of the National Society were on hand to help the Society celebrate its 25th birthday in New York.

First President

Dr. D. B. Steinman, founder and first president of NSPE, addresses a luncheon honoring past presidents.

The thirteen were honored at a special luncheon on the final day of the convention. Present were D. B. Steinman, the first president from 1934-1936; Perry T. Ford, 1939; J. W. Beretta, 1941; Ritchie Lawrie, Jr., 1946-1947; Alex Van Praag, Jr., 1948; Sidney L. Stolte, 1950-1951; L. L. Dresser, 1951-1952; John D. Coleman, 1952-1953; T. Carr Forrest, Jr., 1953-1954; Clarence T. Shoch, 1954-1955; Robert J. Rhinehart, 1956-1957; Garvin H. Dyer, 1957-1958, and Clark A. Dunn, the retiring 1958-1959 president.

In an emotion-filled address, Dr. Steinman, the founder and first president of NSPE, described the gathering as a "dream come true."

"Twenty-five years ago, in 1934, all of this was only a dream. I dreamed of a national organization of, by, and for all engineers—a national organization dedicated to a great cause, a defined, integrated and unified engineering profession.

". . . When I look about me today and see the visible consummation of my dream, I am overwhelmed with emotion, with the blessed feeling that my life has not been in vain."

At times wiping tears from his eyes, Dr. Steinman recounted his efforts in establishing the Society in 1934 and leading it through its early years.

"Now, looking back across the span of twenty-five years, we can view the results of our vision and sacrifice with a deep glow of satisfaction," he said. "The National Society, started in 1934 with only four young state societies, now numbers a total of 50,000 members, 50 member state societies and 400 local chapters, with 4,000 committees, all working for the advancement of the engineering profession in public recognition and esteem.

". . . Our dream has come true. We have achieved public and legislative recognition that engineering is a profession, that engineering is a learned profession, that engineering is one profession.

"Moreover we have reminded the world that engineering is founded on great ideals—the ideals of vision, character, integrity and service to humanity.

"Whether or not our dedicated part in this achievement will be forgotten, matters little. What counts, in my mind and in my heart, is that this accomplishment for the advancement of our beloved profession will endure. Our work will live after us. We are building not for ourselves, but for posterity. . . . For those of us who have known the struggles and the hardships of engineering in the lean and difficult years, there is deep satisfaction in knowing that we have done our part in making engineering a finer, nobler, and more satisfying profession for those who come after us," he continued.

Executive Director Paul H. Robbins reviewed each president's contributions to the Society as they were introduced at the luncheon.

Society Past Presidents

Past presidents of NSPE were honored at a luncheon on the final day of the convention. Front row, l.-r., are: Messrs. Van Praag, Ford, Steinman, Beretta, and Lawrie. Back row, l.-r., are: Messrs. Stolte, Dresser, Rhinehart, Shoch, Forrest, Dyer, Coleman, and Dunn.

NSPE Board of Directors, 1959-1960

MEETING

(Continued from page 38)

fundamental weaknesses of EJC could be affected by NSPE's affiliation with it because it would still be a federation of societies—many of whom include members who are not engineers—and it would still have the basic weaknesses inherent in such a federation."

At the same time, the Board reaffirmed its belief in the principles of the so-called Functional Plan as originally planned by the American Institute of Electrical Engineers. This plan calls for recognition of separate responsibilities assigning those of a technical nature to the EJC; educational matters to the ECPD, and professional activity to the NSPE.

A resolution submitted by the Washington Society of Professional Engineers concerning the employment of consulting engineering firms in the Federal Interstate Highway System program was rejected after functional sections for consultants and government engineers went on record against the proposal.

The resolution proposed, in effect, that NSPE policy favor using more consulting engineering services in the program. Both functional sections opposed adoption of the resolution primarily on the grounds that NSPE Policy 54 adequately covers the situation. The NSPE policy, as it now stands, "advocates that it is in the public interest that experienced engineering firms in private practice be engaged to supply the peak demand for engineering services required by this program."

In turning down the new resolution, the Functional Section for Consulting Engineers in Private Practice expressing concern over a number of recent criticisms of the use of consulting engineers in various Federal programs. "These criticisms show an obvious lack of information or even a viewpoint based on misinformation which must be corrected," the group said.

The Section announced that it had undertaken a complete review of the criticism and was making plans to submit statements on the situation to appropriate Congressional committees.

The Administration's opposition to separate classifications for engineers and scientists in government service was sharply criticized by Leonard White, chairman of the Functional Section for Engineers in Government.

"Insistence upon identical personnel practices for a GS-9 engineer and a GS-9 clerk in today's economy is completely unrealistic and impractical and can only result in unfavorable employee relationships," Mr. White told the Board.

In an action by the Board of Ethical Review, a group of engineers who resigned their positions with a Federal agency to accept employment with a foreign government at the time the latter was concluding a contract with the Federal agency for a hydroelectric project was found to be in violation of the spirit but not the letter of the Canons of Ethics.

The Board said it "made little difference in the basic ethics of the problem whether a man leaves the employ of the government to open his own consulting office or whether he goes to work on a salary for a consulting engineer; it tends to bring dishonor to the profession of engineering if the man devotes his energies, while still employed, to promoting his future practice or employment on the basis of having inside information which would lead to greater profits, if he can secure a position or enter into a contract to further details of the identical project."

There was one dissent to the majority report. The report was received by Board of Directors with instructions that the ethics board consider drafting a canon which would more adequately cover such situations.

(Continued on page 42)

Linder in Panel

Clarence H. Linder, vice president of General Electric Company, speaks during a panel discussion on the "Merging Role of Engineering and Science."

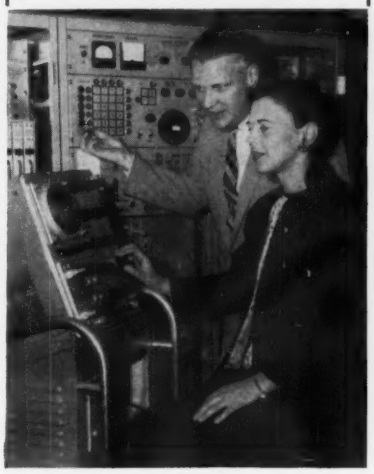
'Ambassadors' Plan March Tour

An effort to forestall the "Ugly American" concept in the minds of those who come into contact with American engineers overseas will be launched next spring by NSPE, which is sending two of its outstanding members, a husband and wife team, to South America on a combined fact-finding and goodwill tour.

Rodney D. Chipp, director of engineering of ITT Communication Systems, Inc., and Dr. Beatrice A. Hicks, president of Newark Controls Company, Bloomfield, N.J., will tour selected South American countries next March as a part of NSPE's unique Project Ambassador. They were chosen from among more than 2,000 professional engineers who expressed an interest in this assignment by a panel of judges which included Audrey A. Potter, dean emeritus of engineering, Purdue University; William F. Ryan, vice president (retired), Stone and Webster Engineering Company, New York, and C. Y. Thomas, vice president, Spencer Chemical Company, Kansas City.

Clark A. Dunn, outgoing president of NSPE, in making the announcement at the annual meeting, said: "All American engineers and technicians working abroad must acquit themselves well as unofficial representatives of the United States and the corporations which employ them. If they do not, the publicity inevitably generated is harmful not only to the profession of engineering but also to our country. The situation is not critical, our objective is to do whatever will help it from becoming so. We cannot undertake preventative maintenance with respect to tourists and businessmen, but as a professional society we will try to define the problems faced by engineers overseas and those with whom they rub elbows—and then see what we can do to solve them. I believe we are the first non-government group in the United States to undertake an effort of this kind."

Engineering Team



Project Ambassador winners, Rodney Chipp and wife, Dr. Beatrice Hicks, at work.

Rodney Chipp and Beatrice Hicks will not be on a "banquet tour" but rather participate in a series of informal discussions with well-informed, key people including heads of South American firms, deans of leading South American engineering schools, and government officials, as well as American engineers experienced in the areas they will visit. They will also inspect as many as possible of the most important engineering developments where they go.

Upon their return to the United States they will report their observations to NSPE. This report will be the first step forward in a long-range action program planned by NSPE to better equip American engineers and technicians to deal with the many social and cultural differences which exist between the United States and other parts of the world.

Dr. Dunn pointed out that South America is of vital concern to NSPE for three reasons: because many American engineers and technicians are working there; because it represents a tremendous potential demand for engineering assistance, and because hemispheric solidarity is a key to our national defense.

The professional society will work closely with the State Department, International Cooperation Agency, and United States Information Agency, as well as embassy staffs in Washington, to develop an itinerary for the tour.

NSPE's Project Ambassadors, Rodney Chipp and his wife, Dr. Beatrice Hicks, were announced on the opening night of the convention. Here they pose with Dr. Clark A. Dunn, outgoing president of the Society. Dr. Hicks holds a handful of coins from South American nations which she and her husband will visit next March.

Thoughts on Professionalism...

By PAUL H. ROBBINS, P.E.
NSPE Executive Director

The Engineer and Culture

IT is disturbing to read every now and then observations, usually of individuals, that an education in science, mathematics, or engineering seems incompatible with the finer things in life. Archibald MacLeish, writing in the *Saturday Review,* recently warned against educating too many engineers and scientists lest the nation become materialistic, with danger of destroying the heart and essence of American life.

READERS of the AMERICAN ENGINEER will recall the disturbing results of a survey by Purdue University several years ago which showed an alarmingly-high percentage of high school students feeling that scientists and engineers could not be trusted, were unusual people, and did not lead normal lives. The survey more recently by the University of Washington, quoted last month in this column, indicated a general feeling by the public of little contribution to the welfare of the people coming from engineers.

HORACE C. KNERR of Philadelphia in a letter to the editor of the *Christian Science Monitor* commented on the statement by Mr. MacLeish as follows:

"It is hard to understand why anyone should suppose that education along scientific lines could contribute toward a materialistic attitude. The days of conflict between science and religion are long past. The business of an engineer is to deal with truth, and to work with the forces of nature. The more we learn about the laws of the universe, the greater reverence we must feel for its Creator.

"An engineer appreciates this as much as a poet, the latter with words, the former with works. In any engineer worth his salt, you will find a man of active imagination, fine sensibilities and deep appreciation of beauty in every form. A crystal of metal, a Golden Gate bridge, a jet transport plane, are beautiful to those who really see them."

IT would be interesting if it were possible to tabulate the participation of engineers in the cultural aspects of every community. A great many engineers are active in civic affairs, serving on school board, church leaders, and devotees of literature, music and the arts. Unfortunately, the tendency is to identify these engineers with their employer, the community in which they live, or identification other than their profession. Engineers themselves can do much to change these concepts by using every opportunity available to them to stand up and be counted as a member of a profession second to none in its contribution to the welfare of the people.

MEETING

(Continued from page 40)

Engineers in Employ of Private Practitioners Subcommittee

—Recommended that the "Survey Report—Engineers Employed by Private Practitioners" be conducted in 1959-60 and hereafter be placed on a triennial basis. The request was taken under study with instructions that it be considered for the new budget.

Engineers-in-Industry Subcommittee

—Announced that an outline of a professionalism course will be ready to be distributed to interested engineering schools before the start of the next school year. The outline is based on materials gathered for a comprehensive textbook which the Subcommittee plans to publish on the subject.

—Reviewed the Western Electric case in which NSPE has filed a friend of the court brief with the NLRB. The case involves a forthcoming new election among engineering employees at the company.

—Announced it was making a study for a possible revision of NSPE policy statement on collective bargaining. The Subcommittee said it was in full agreement that the current statement should be revised for the purpose of clarity and vigor. It said it also arrived at preliminary conclusions that Policies 26 and 28 dealing with legislative aspects of labor policy should be combined or coordinated.

—Reviewed efforts by NSPE to protect the separate voting rights of professional employees in the construction industry in connection with the current Kennedy-Ervin labor reform bill.

—Revealed that "active study" is being made of affiliation with NSPE of engineering sounding boards at the Evendale, Ohio, Schenectady, N.Y., and Pittsfield, Mass. General Electric plants. One sounding board, at Minneapolis-Honeywell, has already affiliated with NSPE.

—Received approval from the board to extend the Engineering Practices Newsletter and Legislative Bulletin to all national techni-

Zurmuhlen Honored

Frederick H. Zurmuhlen, commissioner of public works in New York City, was named "Engineer of the Year" by NYSSPE. Here he accepts the award at NSPE's annual convention.

cal societies having student chapters.

Scholarship Committee

Preliminary plans for enlargement of NSPE's scholarship program were approved on recommendation of the Scholarship Committee. The Board approved a $300 expenditure for the printing of a brochure which will be used in soliciting additional scholarships from industry. The expanded program will follow the same general line as the present Armco-NSPE scholarship project which this year awarded $3,000 scholarships to five high school seniors.

Committee on Engineering Technicians

A certification program for engineering technicians employed in industry was taken under study. The program, as outlined by the Committee, would establish three grades of engineering technicians and one grade of engineering technologist.

On recommendation of the Committee, the Board decided that the NSPE occupational guidance activities should include guidance for prospective engineering technicians in the same manner that activities are conducted for prospective professional engineers. The report, however, recommended that no attempt be made to foster an organization for engineering technicians within the NSPE structure.

NSPE, should, the Committee said, concern itself with anything that would improve the situation of the engineering technicians. This would include industrial training programs, the Committee said.

Student Chapter Committee

The Committee announced that the University of Pittsburgh Student Chapter had become the first student chapter to become affiliated with the NSPE program.

The Committee also received permission from the Board to again invite state societies to request student chapter member kits for distribution to existing student chapters in engineering colleges with ECPD accreditation. A move from the floor to extend the kits to non-accredited schools was killed.

The Committee urged that state and local societies develop programs of support for student chapters in keeping with the NSPE program.

Public Relations Committee

—Announced the completion of a Public Relations Manual for the use by state and local chapters. The Committee also reported the introduction of a new Public Relations Newsletter and the completion of the film "Building for Professional Growth" during the past year.

Engineers' Week Committee

—Recommended that a film be obtained for distribution during the 1960 Engineers' Week. Suggestions for the film should be sent to the National Engineers' Week Committee at NSPE headquarters. The Committee also suggested that local chairmen for the 1960 observance of Engineers' Week be appointed no later than the first regular chapter meeting next fall.

Membership Committee

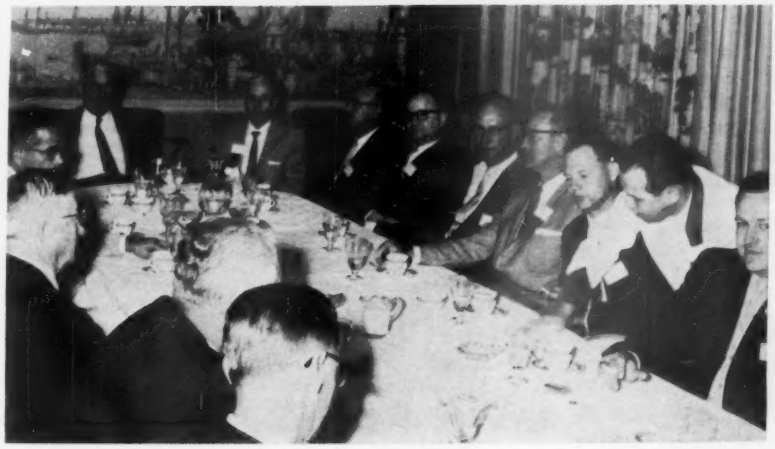
—Announced that the Society's current membership had 50,150 with four new state societies—Alaska, Hawaii, Maine, and Oregon—added during the past year. Only three states—Kentucky, New Hampshire and Vermont—remain without state chapters, the report said.

Winners of the 1958-1959 membership contest announced by the Committee were: Group I-Wyoming, net gain of 176.9 per 1,000 prospects; Group II-Mississippi, net gain of 107.8; Group III-Tennessee, net gain of 54.4; Group IV-Connecticut, net gain of 55.9; Group V-Michigan, net gain of 52.5, and Group VI-Illinois, net gain of 32.7.

Engineering Preparation Committee

—Urged the directors to play active roles in improving the teaching of science and mathematics in

Southwest Regional Luncheon



NSPE directors and members from the Southwest at a regional luncheon held during the annual meeting in New York City.

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their local high schools. "The professional engineering society, in most cases, embraces the only organized group of citizens able to evaluate the needs of the education in science and mathematics and to speak authoritatively on the subject. Thus responsibility for leadership in conducting surveys, mobilizing the community opinion and taking the necessary action in this area of education rests with our chapters," the Committee said. The Committee also urged engineers to take an active role in sponsoring and advising high school science and mathematics clubs.

Young Engineers Committee

—Recommended that NSPE consider the advisability of developing a record book for the use of professional engineers to record a lifetime of professional development beginning with engineering education, continuing through experience, society membership, offices held and other activity. The Board authorized the Committee to prepare a format for such a record book and to obtain estimates on the cost. The Committee is to report back at the October meeting.

State Society and Chapter Activities Committee

—Received approval from the Board for the publication of a new NSPE chapter handbook for the use at the state and local chapter levels. The Board also voted, on recommendation of the Committee, to have the Ladies Auxiliaries Advisory Committee make an annual report on its activities.

Awards Committee

—Named William F. Ryan as winner of the 1959 NSPE Award and endorsed the nomination of Sylvanus Thayer to the Hall of Fame of Great Americans at University Heights Campus at New York University.

Representative to the United Nations

On recommendation of Anatole R. Gruehr, NSPE representative to the United Nations, the Board voted to apply for accreditation to the United States Mission to the United Nations. The accreditation, Mr. Gruehr said, will allow the Society to more closely follow the developments of the United Nations Technical Assistance Program insofar as it affects professional engineers.

Legislative Committee

The Committee submitted a comprehensive report covering the full range of NSPE legislative activity in the past year.

Resolutions Committee

A resolution instructing the NSPE staff to compile a list of books and correspondence refresher courses which might be used as an aid to nonregistered engineers in qualifying for registration was approved by the Board.

Social Side

In addition to the business sessions, a number of social activities for the members and their wives were held during the four-day meeting. Included was a "Mixer Party" held on Thursday night. Many of the members attended "The Music Man," a broadway show on Friday night. The meeting closed with a dance following the banquet on Saturday night.

An Engineering Progress Exposition, featuring a large number of industrial exhibits, was open throughout the meeting.

The New York State Society headed by Leigh St. John served as the host group. Frank J. Johnson, member of the NYSSPE, was general chairman for the Silver Anniversary meeting. He was assisted by Carl H. Reker, chairman of the NYSSPE Meeting Committee, and John J. Lanigan and George T. Baer, vice chairman.

By Mrs. Garvin H. Dyer, Chairman of the Ladies Auxiliary Advisory Committee.

The Professional Engineers of Oregon became affiliated with NSPE at the fall Board meeting, and we are happy to learn that they have an Auxiliary of two hundred members which was organized in 1951. This year's activities started with a membership tea and included a number of special affairs as well as a well balanced slate of regular meetings with varied programs. Of particular interest is that this Auxiliary gives a tuition scholarship each year in the field of engineering and this year contributed $225 to the Oregon Museum of Science and Industry. Mrs. W. Arno Gish is president and Mrs. Frank C. Linton is secretary.

The San Jacinto Chapter of Texas have organized an auxiliary, with Mrs. T. M. Keiller of Houston as its first president. This new Auxiliary was very active in helping to provide lovely entertainment for the annual state meeting.

The Albuquerque Auxiliary also provided entertainment for the ladies attending the New Mexico annual meeting in February, which included a tour at Sandia Base, with a view of the solar furnace. Representatives from the various auxiliaries gave brief reports at one of the men's meetings.

The Monmouth-Ocean, N. J., Auxiliary has given a scholarship in the amount of $75 for the past two years, to a worthy engineering student at Monmouth College. This Auxiliary has a small membership and is to be complimented for their efforts to promote the engineering profession.

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NASA

(Continued from page 30)

dicated that the question being asked of NASA is: What are we specifically urgent about? Many non-Congressional critics of our space activities have pointed to the difficulty of pinning down American commitment to a detailed long-range program other than Project Mercury. And the latter is, of course, only one of the very early steps in the development of manned vehicles capable of leaving and re-entering the earth's atmosphere. Many firings of the Atlas booster rocket will have to be made before NASA or Defense Department officials will permit one of the Mercury astronauts to go soaring off into space.

Up to the time that NASA got underway as a functioning and contracting agency, the manned satellite project had an unfortunate history of being more or less an orphan among many high priority missile programs. NASA provided the administrative channel by which Mercury could get funding and operational status. But Mercury will place only a tiny capsule in spaced, manned by one astronaut. Dr. S. F. Singer, the University of Maryland physicist who was one of the earliest satellite proponents in this country, has estimated that the Russians have the capacity right now to put two or more men into space, and in a much larger vehicle.

NASA has obtained Senate and House authorization for budget requests totalling some $488 million for the fiscal year 1960. In an era of $80 billion Federal budgets, a figure of less than half a billion dollars is not exactly a staggering percentage of the whole. The relative size of this $488 million figure is placed even more in perspective when it realized that Americans annually spend more than $6 billion on tobacco, and approximately $9 billion on alcoholic beverages. Commerce Department statistics for 1957 show that we spent over $2 billion during that year on cosmetics and toilet articles. The annual amount spent in the United States for chewing gum totals some $325 million. Thus it would seem that the nation is asking its scientists and engineers to bring it across the specifically non-military frontiers of the age of space for not a whole lot more than its citizens spend each year on chewing gum.

The NASA budget request of $488 million may also be placed in comparison with the nearly $30 billion which has been expended to date on the electronic warning system stretching across the top of North America—a system which is being increasingly criticized as ineffective against intercontinental ballistics missiles.— End.

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Progress in Products

ALL-ANGLE DRAFTING MACHINE — Item 30

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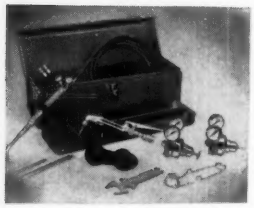
ASPHALT SHINGLE — Item 31

A major advancement in shingles—the fiberglas reinforced asphalt shingle—has been introduced by the Owens-Corning Fiberglas Corporation. The new product uses layers of bonded glass fibers as reinforcement for stabilized coating grade asphalt, and is being manufactured in the standard 12″ x 36″, three-tab strip in four solid colors—black, red, green, and gray—and six blends. The glass fibers needed to adequately reinforce the asphalt weigh only one-fifth as much as the paper-felt used in conventional shingles and as a result it increases the weather-proofing asphalt content.

WELDING OUTFIT — Item 32

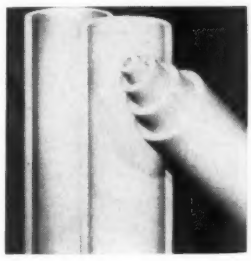


A gas welding and cutting outfit, called the Aircomite, has been announced by Air Reduction Sales Company. With this outfit, operators can weld steel up to 3/8″ thick, cut up to 1″ steel plate, braze and hardface. Built for light and medium duty industrial service, the outfit includes one oxygen and one acetylene regulator, one welding torch with three tips, one cutting attachment and tip, one pressure mixer with gas sealing rings, and other accessories.

AUTOMATIC WELDER — Item 33

A new automatic, pipe welding machine claimed to weld aluminum pipe faster, better and less expensively than ever before possible, has been announced by Aluminum Company of America. According to Alcoa, the welder is the first such machine capable of producing sound welds with full penetration, without the use of back-up rings; with this gain in welding technique, plus high welding speed, the unit completed a pass on 4-inch pipe in eleven seconds, and will further narrow the price gap between aluminum and steel pipelines.

LOW-TEMP INSULATION — Item 34



Entry into the low-temperature insulation field has been announced by the Union Asbestos and Rubber Company with the introduction of a urethane foam pipe insulation to be called UNARCO, U-200. Especially suited for use at temperatures ranging from -300°F. to plus 220°F., U-200 is a closed-cell synthetic and it will not burn. Thermal conductivity tests have shown the insulation to have a K factor of only 0.14 at 70°F. mean temperature.

CHEMICAL METERING PUMP — Item 35

For metering clear and corrosive liquids to chemical processes, Milton Roy Company offers the new Model CM chemical metering controlled volume pump. This unit is job-engineered for metering situations requiring low-cost durability with top-notch accuracy, the manufacturer says. Extensively tested in the laboratory and the field, it delivers maximum capacities to twenty-eight gph in simplex designs and double that gallonage in duplex designs (two liquid ends with a common motor and base). This hardy pump is quality constructed to handle pressures to 1,100 psi.

VERIFAX BOOK COPIER — Item 36

A portable copying unit with a photographic mind capable of memorizing a page in virtually any book in the world has been added to Eastman Kodak Company's line of Verifax Copiers. The unit, designed as an accessory for other Verifax Copiers, makes exposures of documents up to a maximum size of 8½ by 11 inches within ten to fifteen seconds. The exposed matrix paper is then activated to produce copies in any of the four Verifax Copiers available.

SPECIALIZED LUBRICANT — Item 37

A specialized lubricant that is said to prevent galling and corrosion of tapped threads in construction, mining, quarrying, and oil field drilling equipment and that serves as an effective anti-friction, anti-seize compound for certain metalworking, general industrial and marine applications, has been announced by Keystone Lubricating Company. In general industrial use, No-Gall lubricant protects machine slides and lathe dead centers from excessive frictional wear, serves as a drawing and forming compound, and provides an effective moisture-resistant gasket seal.

This column describes new products of general interest to professional engineers. For further information, circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

These listings are informational and are not an endorsement of the products, nor of the manufacturer's claims.

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